

SEXTANT

The Independent Magazine for the Entire Zenith Computer Community
and Users of Zenith-Compatible Computers

\$2.95
March-April 1984
Issue No. 9

Now
Bimonthly!

Why Won't All That IBM
Personal Computer
Software Run
on My Z100?



Screen Dump!

Build a Sound/Clock Board for Your '89
Drawing on Your Heath/Zenith Computer
Clarkson College Puts a Z100 on Every Desk
How One Family Learned to Live with an H89



Photo Courtesy of Zenith Data Systems

8

When marketing the Z100, Zenith Data Systems has emphasized its non-technical, "user-friendly" aspects. Yet it has scored its major coups among people who prize high-tech excellence above most other considerations. The most notable example of this phenomenon came when Clarkson College of Technology agreed to buy a thousand Z100s a year. You might have seen the story on ABC TV or in a national wire-service article. Here's the background and the forecast—what happened long before the TV cameras rolled up, and what will be going on long after it's no longer "tonight's trend."

Features

A Z100 on Every Desk: Clarkson College
Frederick Zimmerman

8

Drawing on Your Heath/Zenith Computer: Ed-A-Sketch
Lee C. Syer

17

Optimizing Benton Harbor BASIC's Numerical Output
Charles W. Rogers

25

The thing that makes a computer a compute-er is its ability to do math. But computers and programming languages like Benton Harbor BASIC operate within certain limits of accuracy. When we understand how BASIC handles numbers, we can get greater precision out of it. And have the numbers printed out with the decimal points all lined up (rather than the left-most digits).

Create Forms on Your MX-80
Leonard E. Geisler

33

Most of us could use professional-looking forms now and then—for bowling teams or small businesses or volunteer groups or just to have an impressive-looking shopping list. Yet "professional-looking" often conjures up the idea of professional printing shops—and the printing costs that go along with them. But your MX-80 printer may be able to give you all you need. Here are the tools to design your own forms.

CHUGCON 83: Sharing Expertise
Frederick Zimmerman

41

Why Won't All That IBM-PC Software Run on My Z100?
Graham Wideman

51

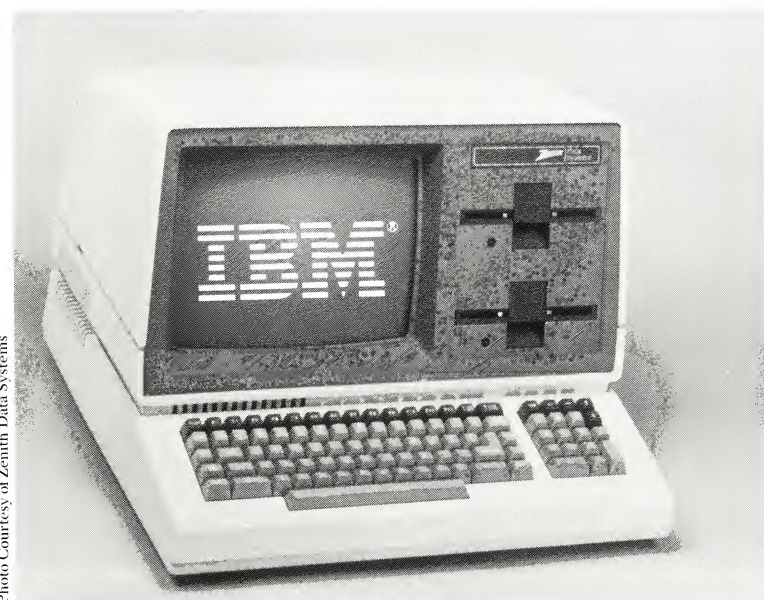


Photo Courtesy of Zenith Data Systems

51

All right, so a lot of us have always had a thing against IBM. But the IBM Personal Computer has all that nice *software* written for it. And theoretically, it *ought* to run on the H/Z100. But (as many of us have found out) it usually *won't*. The author of this article explains why, what you'd need to get the programs to run, and why some problems will probably remain. He guides you through the thicket of programmer "shortcuts" he encountered while stalking the wild interrupt.

Issue No. 9

March-April 1984

Screen Dump!

Siebert Ickler

The information on your screen may be valuable—a strange error message, maybe, or a picture you’ve created. The author explains his assembly-language programs to dump the contents of the screen to your printer or save them to disk. He also points out some of the problems and blind alleys he encountered along the way.

61

More on HDOS STAND-ALONE

Charles E. Cohn

HDOS STAND-ALONE mode allows you to switch easily from your boot disk to working disks. STAND-ALONE is particularly valuable for single-drive users, but also benefits multi-drive users. (It was discussed in *Sextant* #6, Summer 1983.) Here’s a short assembly-language program to install STAND-ALONE automatically upon boot up.

71

Guide to Writing for *Sextant*

John Walker

Other people can frequently benefit from *your* knowledge. Have you thought about writing for *Sextant*? Maybe you should. Just read our guide. *And submit your articles!*

73

Build a Sound/Clock Board for Your '89

Ray Albrektson

Let’s face it: an arcade-trained generation expects that computers should make a lot of noise. The '89’s nice, dignified “Beep!” is not enough. If installing explosions and gongs seems a bit frivolous, however, you needn’t feel guilty. The same hardware that gives the kids their sirens can keep the clock watchers up to date. Here’s what you need to build the board and test it out. And if you want the background needed to program the board on your own, that’s here, too.

78

How One Family Learned to Live with an H89: A Dialogue *Skip and Pam Chambers*

91

Gather around the computer. Smile for the camera. What family picture would be complete without the '89 (or '8 or '100)? Doesn't everything look perfect? Well, the family portrait may not give the whole picture. It doesn't show the nights you stayed up because of Junior's colic. So also, it may leave out the growing pains of the family computer. In the interest of ruthless objectivity, we correct the image a bit.

Departments

The Editorial Eye	3
Letters	5
Index to Advertisers	82
Classified Ads	94
Luminaries	94
Supplier Notes	95
Standard Operating Procedure	97
Disk and File Management	Dean Gibson
Scuttlebutt	101

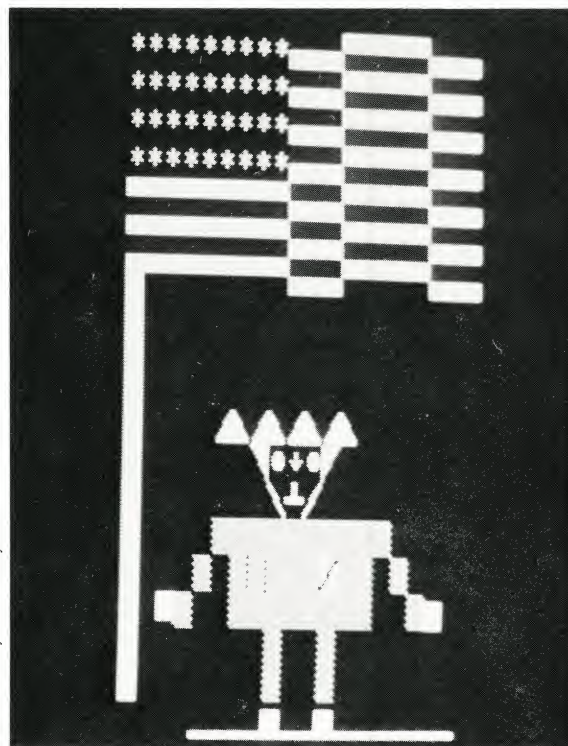


Photo Courtesy of Lee C. Syer

17

For some brands of computers, “graphics” means adding hardware so that the computer can display more than just text. But the H19 and H/Z89 have a graphics character set that can be used for a wide range of graphics needs without adding any hardware. Ed-A-Sketch is a popular program to make the Heath/Zenith’s native graphics ability as convenient and flexible as it can be.

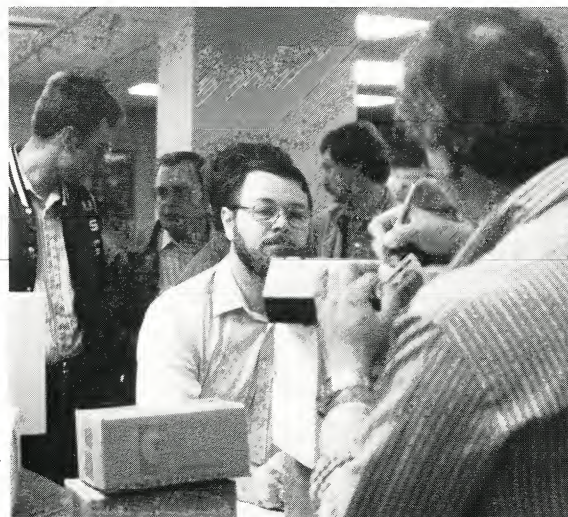


Photo by Charles Floto

41

HUGgies who went to CHUGCON 83 benefitted from seminars, vendor exhibits, classes, speeches, and each other. It was all very sociable and high tech. But in the midst of it, some of the heaviest applause went to Terry Jensen for pointing out that old-fashioned ethics and responsibility still have an important part to play, too.

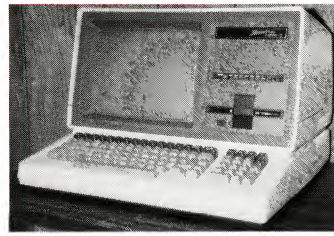
FREE PRINTER WITH COMPUTER PURCHASE!

Buy a Zenith computer with Winchester hard disk at our discount price and you will get everything needed to be up and doing word processing **at no additional cost!**



System I

ZW-110-32 low profile computer system plus ZVM-122 hi-res amber monitor. List \$5668.00



System II

ZW-120-32 all-in-one computer system.
List \$5599.00

The Zenith computer offers you the following features

- Z-DOS operating system—Other software may be added—CALL!
- 192K system RAM to facilitate most programs and spreadsheet manipulation.
- 11.3 meg hard disk for rapid data and program storage/retrieval.
- 1 320K floppy drive for data backup.
- 2 RS-232 serial printer and modem ports.
- S-100 bus slots for future expansion.
- Jacks for light pen and RGB outputs.
- Provision for addition of 8" disk drives.
- 1 Centronics compatible parallel port.
- 192K video RAM for hi-res RGB monitor.

Look! Free with each computer . . .

TTX-1014 daisy wheel printer: has both RS-232 and Centronics parallel inputs. This printer does subscripts, superscripts, line and word underlines. Shadow as well as bold striking are standard. A perfect mate for the text processor. Has adjustable pinfeeds so you do not have to spend additional money for a tractor feed.

Printer cable: serial or parallel, your choice since the printer takes either.

Accu-cut paper: see description elsewhere on this page.

Text Processor V4.1 by Newline Software: extremely versatile and easy to use word processor and formatting software which allows you to see your finished document on screen, as it will be formatted, before printing.

Shipping and handling: shipped free to any address in the 48 contiguous States.

Total SYSTEM I list	6567.00	Total SYSTEM II list	6505.00
SPECIAL PRICE	5127.00	SPECIAL PRICE	5173.00
YOU SAVE!!!	1440.00	YOU SAVE!!!	1332.00

Similar savings available on other systems. Call if interested.

Computers purchased before 12/31/83 come with Lotus 1-2-3 FREE as an extra bonus.
Offer is based on product availability. If an item becomes unavailable before the expiration date of 4/30/84,
we reserve the right to make substitutions or withdraw the offer.

Other products available from ACCESS

"Getting Started with CP/M and MBASIC with particular reference to random files." Features ready to run mailing list programs, program explanations and complete tutorials. **"Getting Started with HDOS Assembly Language Programming."** A primer for the beginner. **SPECIAL PRICE: Both tutorials (regular \$40) now only \$35.00**

Detoken: This program converts compressed IBM (saved without .A) BASICA programs into ASCII format substituting for the tokens so the program makes sense when listed. A must for anyone running BASICA programs on the H/Z100.

INTRODUCTORY SPECIAL.....\$29.95

64K Update for H/Z89: Kit includes memory chips, special sockets, and complete step by step instructions. Requires basic soldering skills. **SPECIAL PRICE..... \$49.95**

Shipping charges (continental USA) are included in the prices above.

Contact UPS for help in calculating shipping charges for the following items.

Accu-Cut Word Processing Paper:
which tear off cleanly to leave a clean sheet of 8.5 X 11, 20#
bond paper. Saves the cost of an expensive sheet feeder.
3,000 sheets per box. Perfect for letters and reports. 35 lb.
shipping weight..... **\$30.00**

Continuous envelopes: #10 plain white envelopes mounted on tractor fed carrier. These envelopes do not fall off going through your printer! 1,000 envelopes per box.

1,000 envelopes per box. 18 lb. shipping **\$52.00**

We carry the full line of Zenith products as well as disk drives, new and refurbished dot matrix and letter quality printers. Check our ribbon prices.

For more details call (215) 272-4807

To order, complete coupon or write if coupon is already removed. Pennsylvania residents add 6% state tax.

Complete and mail this order form with your check or money order today!

Mail to: ACCESS, P.O. Box 1053, Dept. SE1, Norristown, PA 19404

Yes, I want to save money. Send me the following

_____ System I (A saving of \$1440.00 each)	@ \$5127 ea. = \$ _____ .
_____ System II (A saving of \$1332.00 each)	@ \$5173 ea. = \$ _____ .
_____ "Getting Started" tutorials at an extra saving	@ \$35.00 ea. = \$ _____ .
_____ Detoken—BASICA to ASCII converter	@ \$29.95 ea. = \$ _____ .
_____ 64K update for H/Z89 computers	@ \$49.95 ea. = \$ _____ .
_____ Accu-Cut® word processing paper	@ \$30.00 ea. = \$ _____ .
_____ Continuous envelopes	@ \$52.00 ea. = \$ _____ .

PA residents only, 6% tax _____ . _____

Check UPS or call for shipping charges

Shipping _____ : _____

Please enclose payment with order. No CODs for this sale

ACCESS

**P.O. Box 1053—Dept. SE1
Norristown, PA 19404
(215) 272-4807**

Name _____

Address

City _____ State _____

Zip Phone ()

SEXTANT

Charles Floto

Editor
Publisher

Sharon E. Conaway

Assistant Publisher
Advertising Manager

Elizabeth P. Saxon

Production Manager
Marketing Assistant

John Walker

Technical Editor

Jennie D. Allen

Assistant Editor
Production Assistant

Frederick Zimmerman

Staff Writer

Martha W. Swain

Production Assistant
Circulation Assistant

John Gill

Circulation Assistant

Subscription Service • 202/544-0900

Advertising Inquiries • 202/544-2868

Authors' Inquiries • 202/544-2867

Charles Floto • 202/544-0484

Sextant (ISSN 0731-2180) is published bimonthly by Sextant Publishing Co., 716 E Street SE, Washington, DC 20003. Second-class postage paid at Washington, DC and at additional mailing offices. POSTMASTER: Send address changes to *Sextant*, 716 E Street SE, Washington, DC 20003.

Copyright© 1984 by Sextant Publishing Co. All rights reserved. No part of this publication may be reprinted or otherwise reproduced without written permission from the publisher. Printed in the USA by The Sheridan Press, Hanover, PA 17331.

Subscription rates: 6 issues (1 year) in U.S.—\$14.97; in Canada and Mexico—\$17.25; overseas—\$21.00. Payment accepted by check in U.S. dollars payable on a U.S. bank, by U.S. and international postal money order, and by Visa and MasterCard. Please allow six to eight weeks for delivery.

"Heath" and "Heathkit" are trademarks of the Heath Company. "CP/M" is a trademark of Digital Research.

The Editorial Eye

There's no such thing as a monthly magazine. The substitute is to publish three different quarterly magazines under the same title, and sell them under a joint subscription. Each issue takes about three months to produce, with additional time spent editing the articles.

Similarly, by the time the copies of this March-April *Sextant* start reaching subscribers, we'll be well into the production process for the May-June issue. We'll also be working on typesetting for the July-August *Sextant*. We're scheduled to start planning the contents of the September-October issue in late March. (Tentative plans for 1984's staff-written articles were drawn up last July.)

Articles we're preparing for future issues include:

- a survey of hardware to produce color graphics with an H8 or H/Z89
- enhancements to the HDOS device driver for Diablo printers
- notes on starting a local Heath Users' Group
- a BASIC program to turn your computer system into a correctable, pre-viewing typewriter
- a roundup of educational software for CP/M, Z-DOS, and HDOS

We try to have a good balance of articles in each issue, as well as serving the wide range of interests within the Zenith computer community in the six issues we'll be publishing annually. As indicated on the cover of this issue, we also want to serve users of Zenith-compatible computers. Two companies advertising in this *Sextant* have announced plans to produce computers compatible with the H8 and H/Z89. I have reason to believe that, by the time you read this, there will also be a Zenith-compatible computer from IBM.

We'll bring you news of all these developments as soon as our production schedule permits. Some other magazines feel a bit more pressure to rush into print with the latest rumors or advance product announcements. At *Sextant*, we leave such coverage to our sister publication. It travels by first class mail 20 times a year under the name of *Buss: The Independent Newsletter of Heath Co. Computers*. Each issue typically is in subscribers' hands within a week of the editorial deadline. And corrections, updates, or alternative viewpoints can be out two or three weeks later.

Buss was started seven years ago, a few months before Heath's first shipments of the H8 computer. So I figure I've been supporting Heath/Zenith computer users longer than anyone at the Heath Company or Zenith Data Systems. I intend to continue supporting you, whatever happens to them.

Buss has increased in frequency from six issues a year through nine, 16, and 20. Its current somewhat-flexible schedule seems appropriate for the foreseeable future. *Sextant* has gone from four issues annually to six. That also seems appropriate for the next year or two. But we might want to make a change some time. So both *Buss* and *Sextant* subscriptions have always been sold by number of issues, not a fixed period of time. (Each subscriber's "last issue number" is shown at the right end of the top line of the address label.)

Several of our readers have requested that we give more attention to the information needs of novices. So this issue we're starting a new department: "Standard Operating Procedure." We hope it will also be valuable for those who have significant experience with computers, but may have overlooked a simple trick or two.

With issues coming closer together, we'll also be more willing to print a series of articles on the same subject. We've started work on two programming language series—one on Pascal and one on C. *Sextant* will continue to cover events in the Heath/Zenith community. With 50% more issues per year, we'll sometimes be able to do so in a more timely fashion. This issue we're happy to be able to bring you remarks of Terry Jensen which should be of interest to a far larger audience than just those who attended CHUGCON 83.

Charles Floto



DESIGNED TO BRING YOU THE BEST IN PRICE AND PERFORMANCE

HERE ARE JUST A FEW OF THE ITEMS WE CARRY...

MPI DOT-MATRIX GRAPHICS PRINTERS

PRINTMATE 99g	\$CALL
PRINTMATE 150g model B1	\$CALL
PRINTMATE 150g model A1	\$CALL
AP-PAKS (Cable & graphics software)	\$59

DISK DRIVES

TANDON TM-100-1 48TPI, SS,DD	\$199
TANDON TM-101-4 96TPI, DS,DD	\$325
TANDON TM-100-2 48TPI, DS,DD	\$255
TANDON TM-848-2 8" DS, DD Thinline	\$425
QUME QT-142 1/2 Height, 48TPI DS,DD	\$225

ENCLOSURES

SC-100 Single 5 1/4" vertical enclosure	\$75
SC-800 Dual-drive 8" enclosure & fan	\$195
SC-900 Deluxe dual-drive enclosure	\$135
SC-5000 Dual-drive 5 1/4" encl./fan/cable	\$165

MODEMS

Hayes Stack 300 Baud Smartmodem	\$209
Hayes Stack 300/1200 Baud Smartmodem	\$495

Z100 COMPUTERS

All Zenith Z100 Computer models \$CALL

Call us for our LOW Z100 prices and our special FREE software packages!

MISCELLANEOUS

Complete Dual-Drive 8" Thinline disk drive system for Z100 computers. Includes all required components and documentation. \$1070

PRO DRIVER for ZDOS.

A professionally written software modem utility package for Z100 computers. Features Compu-Serve B, Xmodem and Xon/Xoff protocols. Plus auto-logon, user-defined color parameters, easy to read uncluttered menus, help screens and much more for only \$49!

ZENITH data systems

999 South Adams
Birmingham, AL 48011
Phone (313)-645-5365

For complete product descriptions, check our full-line 20 page illustrated catalog or call anytime during our normal business hours from 9:30 to 5:30.

Letters

Z-BASIC Battleship

One thing I liked about your magazine is the shipping protection; having the magazine enclosed in a plastic bag is a great idea. I like the extra care you have taken to make sure that the magazine gets to my house in A1 shape. I hope the bag system is something you can keep doing.

I like having programs with BASIC listings; one suggestion I would like to make is that when you print a BASIC program, include a listing of the changes that would have to be made to make it work with Z-BASIC. The article with the program for Battleship in issue No. 7 looked really interesting, so I decided to rewrite this program to work on my system, without changing it any more than I had to. Instead of the direct cursor addressing used for the H19 I used the LOCATE command of Z-BASIC. Here is a table of some of the other changes:

CP/M	Function	Z-BASIC
CL\$	Clear Screen	CLS
GR\$	Graphics Mode	SCREEN 1,0
RG\$	Exit Graphics	SCREEN 0,0
RV\$	Reverse Video	SCREEN 0,1
VR\$	Regular Video	SCREEN 0,0
BE\$	Bell Code	BEEP

Keep up the good work. I will be looking forward to the next issue.

Dan Walls
Russell, KS

Recatalog Your HDOS Disks

The Fall 1983 issue of *Sextant* (No. 7) contained my article "Index Your HDOS Disks." Along with the MBASIC program was presented a series of patches that would allow the program to restart from a previously run catalog—in effect, to "pick up where it had left off." The advantage of that was not having to spend time re-cataloging disks that had already been indexed. The attached listing contains a second set of patches that will further extend the usefulness of the cataloging program by allowing it to delete a disk from the existing catalog so that it can be re-cataloged. This is handy when you have made several changes to the files on a disk and don't want to go to the trouble of rerunning the complete catalog.

It is possible to delete a certain disk's files from the catalog without these patches. You can use an editor such as PIE to delete the entries from the restart file SY0.FILENAME.DAT, but this is a pretty time-consuming process. Once these patches have been installed, it takes only several seconds to edit the master catalog from the MBASIC program.

To install these patches, you should first add the "restart" patches presented

in Listing 4 of the article, then add the "edit" patches from Listing 1. Then you're all set. When running the program, it will inquire whether you want to restart from a previous catalog. If you answer "YES", it will load the catalog and then ask if you wish to purge the files from any disk so that that disk can be re-cataloged. If you answer "YES" it then prompts you for the name of the disk and purges all the files on that disk from the catalog. It will then ask for the name of the next disk and keep on merrily purging files until you simply hit RETURN. After that the program runs as before.

One caution: there is an array in the program that stores the names of the disks. This array, V\$, is dimensioned for 256 names. When you delete a certain disk from the catalog and then re-catalog it, its name will be stored twice in V\$. It is theoretically possible, after doing a lot of re-cataloging, to fill up V\$ and have the program abort with an error message. If you expect to do a lot of re-cataloging then you might want to increase the dimensions of V\$. The reason that the program doesn't purge obsolete names from V\$ is that there is a lot of cross-referencing of this array to other arrays and many statements would have to be added. It's simpler to increase the dimensions of V\$.

Stephen E. Auyer
Pittsfield, MA

More on the Z100's Key Click

I enjoyed D. C. Shoemaker's article on Z-DOS assembly language in the Winter 1983 issue of *Sextant*. I don't have much experience in programming, and it was very interesting to see how .COM programs are developed. However, as his example he made a program for eliminating the key-click feature on the

Z100, and suggested that this was the simplest way to "do something useful which would be cumbersome or impossible to do any other way."

As a matter of fact, there is a much simpler way to eliminate the key-click or, for that matter, to set any other desired Z100 parameters at start-up in Z-DOS (see Z100 Users Manual, pp. B.14-B.17 for a list of these parameters and their ESCAPE codes). Most full-screen editors have a "next character literal" function by which ESCAPE characters can be entered in a line of text. I am familiar with Vedit and Final Word, both of which have it. If you prepare your AUTOEXEC.BAT file with one of these editors, and have the first line of the file consist entirely of the desired escape codes (including ESCx2 to eliminate key-click), these will all be entered automatically at start-up, which will configure the Z100 exactly as you prefer. Try it. It works.

A. Kent Christensen
Ann Arbor, MI

Jumpers for 16K ROM

A note regarding the confusion on jumpers (Glenn Roberts' letter, Winter '84) when a Z100 has the 16K "fancy" monitor ROM installed. Existing ROMs out there in the world should fall into one of the following categories:

Label	Version*	Size (bytes)
444-87	1.0	8K
444-87-1	1.1	8K
444-87-2	1.2	8K
444-87-4	2.3	16K
444-87-5	2.5	16K

*type 'V' at hand prompt

A board with an 8K ROM should have both jumpers J101 and J102 in the 0 position (closer to the center of the motherboard). With a 16K ROM, jumper J102 should be moved over to the 1

```
1628 INPUT "Do you want to re-catalog a disk <YES/NO>";S$
1629 IF LEFT$(S$,1)="Y" OR LEFT$(S$,1)="y" THEN GOSUB 2940
2940 REM
2950 REM - routine to purge portions of data file.
2960 REM
2970 D$="": INPUT "Name of disk to be re-cataloged <RETURN to stop>";D$
2980 IF D$="" THEN RETURN
2990 DD=0
3000 DD=DD+1: IF V$(DD)=D$ THEN 3030
3010 IF DD<=ND-1 THEN 3000
3020 PRINT "Cannot find disk ";D$: GOTO 2970
3030 FD=0: I=1
3040 IF FV(I)<>DD THEN 3080
3050 FD=FD+1: IF I>=NF-FD+1 THEN 3080
3060 FOR J=1 TO NF-FD: FV(J)=FV(J+1): FL(J)=FL(J+1)
3070 FV(J)=FV(J+1): DA!(J)=DA!(J+1): NEXT J: I=I+1
3080 I=I+1: IF I<=NF-FD THEN 3040
3090 NF=NF-FD: PRINT FD;"files were deleted.": GOTO 2970
3100 END
```

Listing 1: This patch enables the Disk Master Directory Program to delete a disk from the existing catalog so that it can be re-cataloged.

position (toward the edge of the board). This is an area for possible confusion because of a screening mistake by the PC board manufacturer. Jumper J102 is a make-or-break for Buffered Address 13; and J101 does likewise for BA14. This is probably the reverse of what your Motherboard Schematic MB2 tells you about these two jumpers (at least, it is so on my 1982-vintage schematic).

It takes eons for the board supplier to implement any design changes or corrections; but, hopefully, both the screening error and the blue wires on the back of the board will disappear—as the feller said—Real Soon Now. We hope that this helps.

Mark R. Van Sickle, Mark Mangerson
Z100 Motherboard Techs
Circuit Board Test Dept.
Heath Company
Benton Harbor, MI

No Response from RP Enterprises

RE: R. L. Peterson DBS RP Enterprises
On or about June 15, 1983, after the article in *Sextant* regarding the above firm's product, I sent an order and check for their product.

On or about August 22, 1983, I requested information on my undelivered order.

About a month ago [in mid-October] I wrote cancelling my order and requesting return of my check. The check, fortunately, has not been cashed.

None of these communications has been acknowledged.

In the Fall issue of *Sextant* you carried an advertisement for this firm. Since you have promoted this firm via article and advertising I think you owe it to your subscribers via *Buss* and *Sextant* to advise them not to deal with this unreliable and non-responsive firm.

You might also mention that a similar product is available from Analytical Products, who advertised on page 90 of the Fall *Sextant*.

Don M. Deck
Lone Pine, CA
[Analytical Products, 29924 Road 168,
Visalia, CA 93291, 209/747-3235.]

Wild Interrupts

I own an H120 computer and am contemplating the purchase of another. It was my understanding from the salesman that the Heath 120 was compatible with the IBM PC. I preferred buying the Heath but liked the idea of using the many programs available for the IBM. I

have tried to run VisiCalc as well as several others that were designed for the IBM but they would not run. All I got was a wild interrupt.

The dealer now advises me that I need an IB Emulator to run IBM programs, and the execution time will be increased. He also advises me that not all IBM programs will run, either.

Can you advise me as to a good solution to this problem, and does Zenith or Heath plan a hardware modification in the near future that will allow compatibility with IBM software in the future?

My decision to purchase the second unit will be based on a solution to that problem.

Charles F. Williams, D.D.S.
Jacksonville, FL
For an explanation of the causes and some cures for Z100/IBM incompatibility, see "Why Won't All That IBM-PC Software Run on My Z100?" by Graham Wideman, in this issue. We will be dealing with the area of software compatibility in future issues.

Lucidata Pascal

I have read and enjoyed Mr. Kenner's article in *Sextant*, issue #6, "Pascal Elucidated," devoted almost exclusively to Polybytes' Lucidata Pascal compiler, and have some observations concerning his follow-up letter in issue #7, "Lucidata Pascal Addenda."

I've run a comparison between RUNCOM and PRUN on several of my programs, plus the PRUN configure program (CONFIG.PAS) included with the Polybytes Lucidata Pascal compiler, and have consolidated the results for anyone interested. (See Table 1.)

These results were obtained using a double-sided 80-track drive and HUG's system driver. As you can see, the time to compile a typical program with a 56K system is almost three times faster using RUNCOM rather than PRUN.

Mr. Kenner, in his article, mentioned a bug he ran across during his introduction to the compiler but never mentioned what that bug was. One runs up against one bug when one tries to compile CONFIG.PAS, the configuration program supplied with the compiler. It seems that hex addresses cannot be used as constants. Editing CONFIG.PAS and substituting the hex addresses in the program fixes that bug.

Another bug which I found and which was addressed by Mr. Reeve was my inability to use dual pragmats in the PRUN

command line, such as \$B for line input to a program combined with \$C for a stand alone program.

DEV:PRUN \$B \$C:PROGRAM PROGRAM will not work as one would suppose. Mr. Reeve has informed me that DEV:PRUN \$B\$C:PROGRAM PROGRAM will, although I have not tried it, preferring to set LMODE within the program such that both character and line input mode can be used when appropriate.

Donald E. Risher
Charleston, WV

Corrections

Some backslashes were omitted from the article "Letter-Quality Printing on a Dot-Matrix Budget," by Gordon W. Nichols, in the Winter 1984 issue of *Sextant*. In the second column of page 21, the command to underline the word "computer" should be: "\OUT25\computer\OUT 25\".

Applied Statistics, mentioned on p. 87 of the "Z100 Software Roundup" in *Sextant* #7, is available from Sunflower Software, 13915 Midland Drive, Shawnee, KS 66216, 913/631-1333.

Sextant readers interested in Public Domain Software from Furman Smith (Games Roundup, p. 50, *Sextant* #8) may obtain it directly from him at 87 Creek Drive, Montgomery, AL 36117.

Sextant Back Issues Are Still Available!

If you've missed even a single issue of *Sextant*, you've missed at least 88 pages of information about *your* brand of computer system—Heath/Zenith.

Sextant published eight issues in its first two years. Each one contained articles and advertising chosen especially for their interest-value to Heath/Zenith users. According to a poll of *Sextant* readers, some of the most popular articles were: building "A Parallel Interface for the '89" and "Disk Programming Without HDOS" (#1, Spring 1982); "Crucial Secrets of HDOS" and a preview of the Z100 (#2, Summer 1982); "Interrupt Programming Under HDOS" (#4, Winter 1983); "CP/M: The First 13 System Calls" (#5, Spring 1983); "Pascal Elucidated" and assembly language "Inside a Spooler" (#6, Summer 1983); a roundup of over 80 software products for the Z100 (#7, Fall 1983); "Getting Into Z-DOS Assembly Language" (#8, Winter 1984).

You can still have *all* the information you need about your system. *Sextant's* back issues are still available, in limited quantities. To get yours by first class mail, send \$3.50 for each issue and tell us which ones you want. Write to us at Sextant, 716 E Street S.E., Washington, DC 20003. Or call us at 202/544-0900 and charge your order to Visa or MasterCard.

Program	.PAS	.BIN	COM	Compiler Time		Ratio
	Sectors	Sectors	Bytes	RUNCOM	PRUN	
LISTDIR.PAS	11	6	1500	1:28	3:54	.378
CORRECT.PAS	13	5	1104	1:36	4:13	.378
MAIL.PAS	26	12	3024	2:39	7:37	.349
CHECKING.PAS	41	19	4804	4:12	12:48	.327
CONFIGP.PAS	50	31	7656	5:47	17:13	.336

Table 1: A comparison of compiler times for RUNCOM and PRUN.

* H8 is a Registered Trademark of the Heath Company.

NEW PRODUCTS -



- SALES & SERVICE

Complete Support for the **H8 * COMPUTER**

New
Machines
Available

64K MEMORY BOARD (2-4 MHz)

Over 1500 Sold - 1981, 1982, 1983

Z80 CPU BOARD (2-4 MHz)

Features Software Control of Clock Rate

HIGH-SPEED MOTHERBOARD

90 Pin Buss with Auxillary Card Positions

UNIVERSAL DISK CONTROLLER

5 in. Floppy / 8 in. Floppy / Hard Disk

16-BIT CPU BOARD (8086/8088)

Co-Processor With 8-Bit CPU Board
Fully IBM PC Compatible

MASS MEMORY BOARD SET

1 Megabyte Peripheral Data Storage

LEFT SIDE PANEL with FANS

Dual 5 in. Fans with Speed Control

MEMORY BANK SELECT CARD

Uses Old H8 Memory Boards

MATHEMATICS CARD

Dual Chip Card for 9511/9512

COLOR GRAPHICS BOARD

H8 Interface to Video Monitor
Use For IBM PC Graphics

Call or Write for Free Brochure

Phone (714) 830-2092

TRIONYX ELECTRONICS, INC.
P.O. BOX 5131, SANTA ANA, CA 92704

A Z100 on Every Desk: Clarkson College

*ZDS stumbled into the
academic marketplace when one college
ordered 4,000 systems.*

Frederick Zimmerman

Clarkson College of Technology is the first college to issue a personal computer to all its entering students. Every new student in Clarkson's class of 1987 has been issued the low-profile version of the Z100, with one disk drive and 192 kilobytes of random-access memory (RAM). The students each pay slightly more than \$200 per semester, plus a one-time maintenance deposit of \$200, for a total outlay of about \$1800—and they get to keep the computer after they graduate.

Clarkson is a 4,000-student coeducational engineering, science, and management school located in Potsdam, New York, in the state's northernmost tip. There are already about a thousand Z100s on the Clarkson campus, and the college will be adding another thousand a year with each new entering class. Eventually, every student and faculty member at Clarkson will have a Z100.

Clarkson's activities are likely to be of interest to Heath/Zenith users for several reasons. First, Clarkson is going to be one of the first educational institutions where microcomputers will be issued to every student. The widespread availability of microcomputers may be a very important development in education—and they're using *our* Z100s.

Second, selling so many computers to Clarkson has helped Zenith Data Systems (ZDS) sell Z100s to other academic institutions. ZDS has now made group purchase arrangements at more than 75 campuses. Zenith is establishing a niche for itself in the academic computer market.

Third, the national news coverage resulting from the Clarkson sale has provided some important publicity for Zenith Data Systems. ZDS has an unusual and perhaps enviable relationship with its customers: their biggest complaint is that Zenith doesn't sufficiently advertise the virtues of its products. When Clarkson issued its Z100s, they appeared on ABC's "Good Morning, America," as well as the nightly network news shows, and the AP wire carried the story.

Finally, there is a higher concentration of Z100 users at Clarkson than virtually anywhere else in the world—perhaps even higher than in Benton Harbor-



Photo Courtesy of Zenith Data Systems

Saint Joseph, Michigan, the site of the Heath/Zenith manufacturing facility. Since Clarkson is primarily an engineering school, there will be a substantial number of technologically sophisticated people playing around with the Z100. Clarkson could become a major source of new software and hardware products for the Z100.

In late September, four weeks after the beginning of classes, I spent three days visiting Clarkson.

How Clarkson picked Zenith

How did Clarkson get hooked up with Zenith? I asked David Bray, Dean of Educational Computing Systems.

"Well, it was a chance occurrence, really. When did we start? Two years ago [1981] we got started on this plan" to equip every student with a personal computer. "We got serious in October. In the spring [of 1982] we had a small committee—I hate to call it a committee, it was really a class. We invited faculty members, and we actually signed students up, and they got credit for attending class. We did all kinds of things concerned with what kind of micro we should pick, what kind of network we should work on...."

"We'd settled that we really needed an IBM PC-type compatible machine, compatible in the sense of reading disks—just to solve the disk problem. Because it was just clear that so much software was going to be made available for the 8086 and 8088 processors, and a lot of colleges were interested in the IBM. So it was pretty clear that we just had to do that. We made some very informal specs, and we sent them to anyone we

knew that was making a 16-bit machine, that we thought would be IBM-compatible.

"In the end we heard—seriously heard—from Northstar, IBM, DEC—and a lot of other people"; Bray noted Commodore in particular. "So we heard from quite a few people. But right at the end, when we were about to make a decision, on the first of August, we got a call from the local Potsdam dealer. He said, 'We hear you're looking for lots of computers. Maybe we can help.' I said, 'Well, I doubt it, because we're working directly with the manufacturers. We couldn't possibly deal with a dealer from a price point of view.' He said, 'Well, I know, but maybe I can help anyway.' So I said, 'Sure, fine,' so I told him all our specs on the phone."

"I hung up and laughed, told my secretary: 'There's another one of those nuts.' Because we got a lot of people who called, thinking they could somehow help. And by God, an hour later the national sales manager of Zenith called. He said, 'Hey, Mike Jones says you're looking for a 16-bit machine.' I said, 'Yeah, I didn't know you guys were making one.'"

"He said, 'Well, we haven't announced it yet, but we are, and we're about to announce it any day.' So I said to myself, 'Oh, yeah, another two years and they'll have it.' So I told him the specs, and I said 'When can we have a prototype?' I didn't really care about the prototype, I wanted to know where the production situation was. He said, 'Oh, next week.' I said, 'Oh, yeah?' 'Yeah, we're starting production next week.'"

"So I told him all the situation, told him the kind of pricing we needed, all the software we needed. He said, 'Well, I'll let you know.' Twenty-two hours later, he called up and said, 'Okay, we'll do everything you want.' We said, 'Great, get us that machine there quick.' Our leading contender probably was Northstar. But we weren't awfully happy with that in the sense that they would have had the Advantage this year, and next year they're going to have something new.... So then the machine [the Z100] came, and it took us five minutes to decide that was it."

Zenith supporting Clarkson

Zenith Data Systems' top management clearly regards Clarkson as an extraordinarily valuable customer. For example, both Zenith and Clarkson were concerned to make sure that there would be no defective units issued when the freshmen received their Z100s.

To minimize damage caused by shipping and handling, Zenith sent the first batch of 900 Z100s on three ZDS trailer-trucks. A crew of three service experts was sent along to check each machine after unloading.

Dean Bray told *Sextant*: "They took every one of those machines out of the box—900—and they ran them through extensive tests, and it turned out they had 3% failure, which is exactly what you'd expect. I'm an electrical engineer, and I know that no matter whether you're building a toaster or a television set, and everything's perfect, you'll have 3% failure in the system. That's the absolute standard rate on anything, no matter what it is: resistors, anything. And by God, they got exactly three percent."

When the first batch of computers was distributed August 25-26, Don Moffet, president of ZDS, was there to give an opening address to the entering class. "The president of the company spent two days here.... The national service manager came in, spent two days here. It's unbelievable, just tremendous support. You can sure quote me on that," said Bray. "I've never seen anything like it."

"We've been working with them ever since, and they've just been unbelievably fantastic to work with.... I've never seen anything like it. We could call them up, and anything we want, they'd say 'fine.' ... We worked for four months on Digital and IBM and Burroughs and Northstar and Apple, with their Macintosh, and we just saw nothing like the Zenith response."

"IBM FORTRAN ... is unusable"

Some things Zenith has done to support Clarkson may end up benefitting other Zenith users. For example, Bray told me: "I think we're somewhat responsible for having a FORTRAN that really works on the Z100.... The IBM FORTRAN ... is unusable, *absolutely* unusable.... [Zenith] just pushed Microsoft like crazy.... They made Microsoft make [Zenith FORTRAN] pass all the National Bureau of Standards" tests. (One rumor has it that IBM's FORTRAN didn't pass *any* of the NBS tests.)

Zenith is offering FORTRAN and Pascal to Clarkson students for an exceptionally generous price, a fraction of the normal cost of such professional-quality high-level languages. Incidentally, Clarkson has developed some FORTRAN and Pascal graphics subroutines to run on the Z100. These subroutine packages give students

Toolbox Utilities

Despite the fact that SETUP is really a rather trivial utility, I found it among the most entertaining programs in the Freshman Toolbox. SETUP is a menu-driven utility which allows you to choose new foreground and background colors for the screen; to choose between blinking and non-blinking block and underline cursors; to turn the key click off and on; and to control several other parameters of the Z100 display. (D. C. Shoemaker's article in *Sextant* #8, Winter 1984, describes a simple assembly language programming technique for accomplishing such tasks.) Moreover, with AUTOEXEC.BAT you can instruct the Z100 to automatically set itself to your favorite screen configuration each time you boot. All you have to do is add a command to your AUTOEXEC.BAT

command file which calls SETUP's sister program DOSETUP.

The Freshman Toolbox also includes utility programs which enable you to dump the contents of the Z100 screen to various printers.

Finally, the Toolbox includes a pair of utilities which might save some time for those of you who normally use more than one printer. SETSER temporarily reconfigures Z-DOS for a serial printer: 1200 baud, no parity, one stop bit, XON/XOFF (DC1/DC3), no pad characters, no parity-bit stripping either on input or on output. SETPAR temporarily reconfigures Z-DOS for a parallel printer. Simply typing six letters—SETPAR or SETSER—is noticeably quicker than going through the rigamarole of CONFIGUR.

ZPILOT: a simple programming language for educational applications

Clarkson programmers have developed a Z-DOS version of PILOT, a simple programming language which was designed specifically to help non-technical users create interactive educational programs. As Clarkson's documentation explains, "PILOT is ideal for the instructor who wishes to write outlines, quiz his students, and provide guidance through interactive programming." PILOT is an acronym for Programmed Inquiry, Learning or Teaching. Clarkson's version of PILOT is known as ZPILOT, or "PILOT-Plus."

One of the reasons many educators find PILOT useful is that they can begin programming after learning only a few statements. Clarkson faculty and students have devised a number of ZPILOT programs to help students with the readings for their courses.

Students can copy the ZPILOT programs at a public-access Z100 in the Faculty of Liberal Studies building, and then run the software on their personal

Z100s. The programs are designed to help the students test whether or not they have understood the weekly readings.

I tried several programs written for Professor John Serio's Humanities 195: "Great Ideas of Western Civilization." The quizzes covered such topics as Socrates, the Bible, Shakespeare, and *Zen and the Art of Motorcycle Maintenance*. I concluded that they are useful for a limited, specific purpose: making sure that the students have read the material to the instructor's satisfaction. The higher educational value of the programs depends largely upon the quality of the questions the instructor tells the computer to ask. If you have good questions to ask, ZPILOT will make it easy for you to ask them. And if you are treating a subject which is well suited to short-answer or multiple-choice quiz programs, ZPILOT may be the language for you.

graphics capabilities similar to those available under Z-BASIC.

Zenith's generosity may possibly be guided by a longer-term interest in Clarkson's potential to develop as a source of technical support for the Z100. Since every Clarkson student is required to take a programming course before graduation, and such courses will likely use either FORTRAN or Pascal, there will soon be 4,000 students at Clarkson who have had some formal training in FORTRAN or Pascal programming on the Z100. If even a few of those students eventually become skilled enough to develop salable programs, Clarkson could be a fertile seedbed for Z100 software.

Current software development at Clarkson

Indeed, there is already some interesting Z100 software under development at Clarkson.

The Freshman Toolbox, which was issued to entering students along with each Z100, includes some workhorse programs, such as Clarkson's standard word processor, GALAHAD. In addition, the Toolbox provides students with various utility programs which will facilitate the use of the Z100 and the peripherals available on campus (printers, etc.). Finally, The Freshman Toolbox includes some programs specifically designed for the educational environment: PROOF, a spelling-checker program with features which will force students to build their vocabularies; and KP.BAS, a BASIC program designed to improve students' touch-typing skills.

Other software is being developed for specialized audiences at Clarkson. Members of the Faculty of Liberal Studies needed an easy-to-learn language, so Clarkson has developed a Z-DOS version of PILOT, a programming language which is specifically designed to make it easy to write interactive educational programs. On the other hand, computer scientists and advanced programmers like fast, powerful languages such as C, so work is underway on a Z-DOS C compiler.

(Further information about some of the programs mentioned in the preceding paragraphs may be found in the accompanying comments.)

I came away from Clarkson convinced that the

college will indeed emerge as an independent source of Z100 software.

What's that microcomputer doing on my desk?

Despite the fact that Clarkson is a "College of Technology," not everyone on campus was happy to learn that microcomputers were about to become part of the daily life of every student entering Clarkson.

In November 1982, the Clarkson administration first announced the plan to issue Z100s to members of the class of 1987. The reaction from students was mixed. Later that month, Clarkson's student newspaper—*The Integrator*—published the results of an opinion survey.

(Since the survey was conducted in 1982, it couldn't include anyone from the class of '87. Moreover, almost 90% of the respondents were members of the classes of '85 and '86. Apparently, members of the classes of '83 and '84 simply felt less interest in the survey, knowing that they would have little or nothing to do with the Z100s.)

There were some grumblings that the administration hadn't given students much voice in a major decision about the college's future. "Why doesn't Clarkson give the students a chance to voice their opinions before they make the decisions?" The survey comments also indicated that there were misgivings about the administration's decision to make the purchase mandatory, even at the discount price of about \$200/semester plus a \$200 one-time maintenance deposit. "Make it by free will," one respondent suggested.

There was a considerable degree of pessimism as to the likely social effects of having the Z100s on campus. "I seriously wonder what kind of vegetables this program will attract." A more optimistic prediction: "At first the project will attract a new type of high school student, the 'digithead,' but in time, the Clarkson student will return to his original form."

One of the survey questions was: "How do you think the Z100 will affect education at Clarkson?" Of course, some students were optimistic: "I think it will greatly increase the value of Clarkson's educational system. Computers are here to stay." Some students were more

**Now you can program HERO 1™
from your computer.**

It's a breakthrough by the crack robotics team at Virtual Devices! Meet MENOS I: the control system that brings HERO to life.

**MENOS I's software makes HERO
more fun to operate.**

It's as fast and easy as programming your PC. Because MENOS takes full advantage of a computer's keyboard, memory, and disks—to save you months of time and frustration.

MENOS even performs a diagnostic check every time you start operating. And when you write programs in our high-level

robotic language, MENOS prompts you and checks your syntax. You can edit quickly, then download programs to HERO.

A split window display of motor positions and sensor readings lets you monitor HERO's execution of your program. Or you can simulate the execution right on your computer screen. So you don't even need a robot to learn robotics!

**MENOS I's hardware gives HERO
a mind of its own.**

Besides a more powerful microprocessor and an RS-232 port, you get 34K of memory, with 3 operating systems in ROM—including an upgrade of HERO's own. Plus 4 expansion slots for more breakthroughs.

Our fee is very reasonable.

Especially now through March 31, 1984, when the introductory price is just \$395. With a 30-day money-back guarantee and a full year's warranty on parts and labor.

To find out more, call us or write us at P.O. Box 30440, Bethesda, MD 20814. Better still, order today. And get ready to perform a heroic feat of surgery.

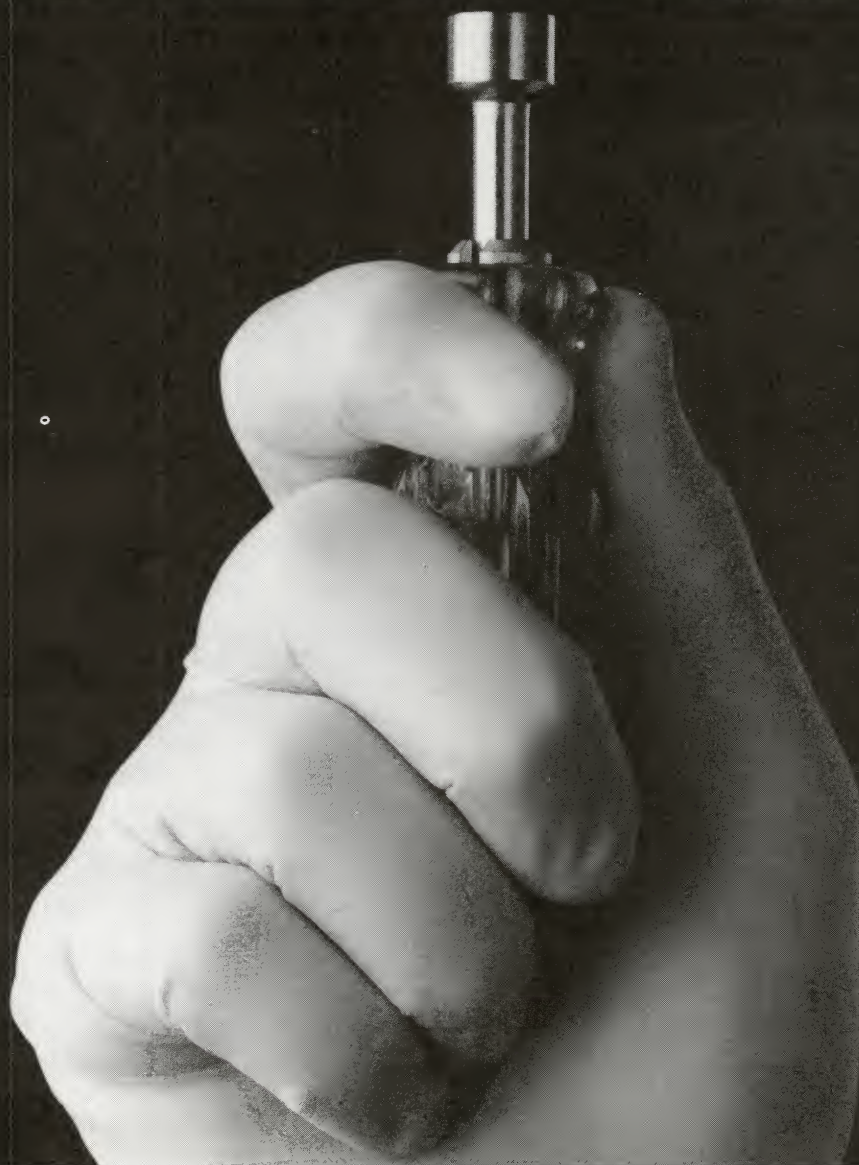
Call toll-free: 1-800-762-ROBO.

In Maryland, 301-986-1702.

**VIRTUAL
DEVICES
INC.**



WORLD'S FIRST BRAIN TRANSPLANT PERFORMED ON ROBOT.



Circle #234 on Reader Service Card

PROOF: a spelling checker that isn't a crutch

The Freshman Toolbox issued with each Z100 includes a spelling checker called PROOF, which is specifically designed for educational use. PROOF is designed to neutralize the danger that using a spelling checker might cause students' vocabulary skills to atrophy. (In much the same way that hand calculators have affected students' computational skills.)

PROOF comes with an expandable dictionary, or "lexicon," which initially contains only 2,500 words. This forces the student to regularly add new words to the lexicon. And the documentation warns, "Be sure the words you add are spelled correctly. There is currently no way to remove misspelled words once they are in the lexicon." This design feature obliges students to look up words which they are unsure how to spell.

Although PROOF is still under development, I should note that the version I saw has some irksome peculiarities. For one, it doesn't distinguish between upper- and lowercase. For another, when it checks the words in your text file, it strips apostrophes and hyphens. So if it finds an unfamiliar word like "Fred's", it will ask you whether you want to enter "freds" into the dictionary. When you're rounding up misspellings and typos, misplaced apostrophes and hyphens are among the usual suspects. Since PROOF isn't very good at spotting such errors, its value is rather limited for business and professional purposes. However, the program is very well suited for its intended purpose, developing students' vocabulary skills. If PROOF becomes available to the general public, parents whose children are using the family Z100 may find this program a valuable educational tool.

skeptical: "It will look good but do nothing," said one.

One student put it all in perspective: "it [the microcomputer] is only a tool for people to express ideas."

Will the Z100s improve students' writing skills?

The Z100s had only been on campus for a month or so when I visited, so it's hard to assess how the widespread availability of microcomputers will affect the quality of education at Clarkson. The most obvious effect I saw was that word-processing programs will relieve students of the burdensome necessity of re-typing papers, saving them significant amounts of key-boarding time. The time saved can be spent on additional research, for example, or on a lot of rewriting.

When a student submits a paper, Humanities Professor John Serio returns it with comments, and asks that the paper be revised accordingly. Now, Serio says, he can ask students to do multiple revisions "without feeling like an ogre." He knows that all his students have word processors and spelling checkers, so there's much less reason for him to accept stylistic infelicities or grammatical irregularities.

When students finish their revisions, they visit Serio's office, bringing along the disk as well as the paper, and Serio pops the disk into his Z100 running the

Clarkson word processor, GALAHAD. Thus he can demonstrate how the student should change the structure of an argument. He can actually use GALAHAD's "cut and paste" features to rearrange paragraphs within the paper. This procedure observes a cardinal rule of teaching (and entertainment): "Don't tell 'em—*show* 'em."

Serio is also asking his students to keep an "electronic journal." As soon as they finish a reading assignment, they're supposed to record their first reactions to the material. This serves two useful purposes: the act of writing forces students to think about what they read, and it gets them into the habit of sitting down at the keyboard.

Of course, asking students to keep a journal isn't a new idea. However, I think the presence of the Z100s at Clarkson should make it much more likely that the students will actually do the work. The difference between using a typewriter and using a word processor is almost like the difference between cooking dinner for yourself and dining in a restaurant every evening. Future generations of students will be able to approach writing without having to worry about all the nagging frustrations of typewriter repairs and liquid paper.

Clarkson supporting Clarkson

So far, everyone agrees that the Z100s have been integrated into campus life with many fewer frustrations than were expected. On the day the Z100s were distributed, a service fraternity called Student Orientation Service (SOS) helped the new students get the Z100s safely to their rooms. Juniors and seniors were stationed around the various dorms to provide help in setting up the Z100s. Faculty and administration gave orientation lectures. As a result of all this preparation, the Z100s' first day at Clarkson went virtually without a hitch.

The Clarkson administration has done its part to ensure that students get adequate "human factors" support for their new microcomputers after the first day's hoopla dies down. Faculty have been instructed to make freshman courses a bit slower this semester, to ensure that no one gets too far behind because of difficulties in adjusting to the Z100.

Clarkson is also providing maintenance support for the Z100s, based on the \$200 maintenance deposit received from students when the Z100s were issued. Thus, if anything goes wrong, the student need not

C compiler for Z-DOS

According to Dean Bray, Clarkson is developing a Z-DOS compiler for C, a programming language which is a favorite of systems and applications programmers. Bray told me that the Clarkson compiler is based on the public-domain C compilers published by Ron Cain and Jim Hendrix in *Dr. Dobbs' Journal of Computer Calisthenics and Orthodontia* in May 1980 and December 1982, respectively. It seems likely that the compiler will be available by the time you read this. "We're going to have a neat C for the college environment," said Dean Bray. "That's going to be a very nice package for the computer science people."

worry about finding the cash to pay for repairs. Clarkson's electronics shop, which is now an authorized Zenith service center, will repair the machine, then subtract the appropriate amount from the student's account with the bursar.

Servicing nearly a thousand Z100s

I thought Clarkson's experience with a sample of almost a thousand Z100s might provide some helpful information for other Z100 owners. So I interviewed Bob Dwyer, who is the chief technician at Clarkson's Z100 service center, and asked him about the Z100s' service record after four weeks on campus. Dwyer gave

Now, Serio says, he can ask students to do multiple revisions "without feeling like an ogre."

the impression that the new users at Clarkson have done a good job of adjusting to their new computers. Overall, he said, "call-backs have been very low"—few repairs have been required.

Nevertheless, I asked Dwyer to identify the most common problem he has encountered with servicing Clarkson's Z100s. He replied instantly: "cockpit error." In his experience, the most likely cause of a seeming malfunction is an underinformed user, not problems with the hardware.

When pressed, Dwyer admitted that he has found hardware faults in a few Z100s. "Disk drives are probably our biggest problem, but they're usually repairable." He offered one useful tip, gained from taking nearly a thousand new Z100s out of the box for testing. After a Z100 has suffered the rigors of being shipped cross-country, the disk drive controller board has a tendency to jiggle loose. This causes a "Device Error" message when the user tries to boot. Fortunately, Dwyer has a simple solution: "Pop the board out, then pop it back in."

Z100s networking with the Clarkson mainframe

How is Clarkson integrating a large number of newly acquired microcomputers into its existing mainframe data-processing environment?

Right now, there is a limited network installed in the Science Center, with 30 Z100s wired up to the school's IBM 4341 mainframe. These Z100s are open to public access, so students can bring disks to the Science Center and access the mainframe from there. When finished with work on the mainframe, they can take the disks home and continue work on a stand-alone Z100.

Clarkson's systems programmers have developed a number of programs to make it possible to use the Z100 and the 4341 in concert. For example, I saw a program called TERM, developed at Clarkson, which enables the Z100 to emulate an IBM 3270 terminal. TERM can also transfer files back and forth between a Z100 and the 4341. Similarly, there is software under development which will allow a Z100 to emulate a Tektronix 4010 graphics terminal.

One area of mainframe-microcomputer interaction will be word processing. GALAHAD, the Z100 word

EDUCATIONAL-UTILITY HDOS CP/M CP/M-85 ZDOS

SUPERMATH1 - Computer Aided Math Instruction

Provides educational math instruction for grades 1 to 6. For home or school use. Features simple and long decimal addition, subtraction, addition, multiplication and division, regular multiplication and division, and subtraction, multiplication runs under MBASIC. (Specify HDOS or CP/M) \$39.95
Also available for ZDOS under ZBASIC. Above features plus carrying and borrowing, lowest common denominator, reduction of fractions to lowest terms, color or monochrome operation. (ZDOS)..... \$49.95

HFORTH-79/HFORTH-79 PLUS - An expanded FORTH-79

HFORTH-79 is based on figFORTH Ver 1.1 and includes the full FORTH-79 standard. Runs under the operating system file structure and uses named files for both program and data disk I/O. Includes a full screen editor, an 8080 assembler and high level constructs. (Specify CP/M, CP/M-85 or HDOS)..... \$34.95
HFORTH-79 PLUS adds floating point math set including 24 trig functions, log and exponentiation, fixed and floating conversions and degree and radian conversion. Also string operations including string and array variables, string comparisons, concatenations and conversions and string input/output operations. (Specify CP/M, CP/M-85 or HDOS)..... \$45.95

PRINTER DRIVERS FOR HDOS

Each HDOS driver listed below contains many user selectable features and eight combinations can be stored at one time. This allows you to change printer formats without having to reconfigure the driver each time. HDOS drivers are also available with built-in spoolers that allow you to print a file while you are using the computer for something else (for example running BASIC).
UD.DVD - A Universal Driver for printers. Operates with virtually any printer through its settable handshaking and format options. Seventeen options settings are available.
H25.DVD - A driver for the H/Z-25 printer. Fifteen option settings plus superscripts, subscripts and double width, underlined and overprinted text.
MX.DVD - A driver for the Epson MX and RX printers. Fifteen option setting plus double width, emphasized, underlined italic, and overprinted characters.
(Each version for HDOS \$29.95
(Each version with spooler for HDOS \$39.95

UD.COM - A Universal Printer Driver for CP/M

This is a printer driver/spooler that increases the printing capability of CP/M 2.2.xx. UD.COM has capabilities similar to UD.DVD and contains a built-in spooler that queues up to four files with multiple copies and optional titles and page numbering. (Specify CP/M or CP/M-85)..... \$39.95

SUPER SYSMOD2 - An HDOS Enhancement Program

This program modifies HDOS 2.0 to provide an expanded set of new commands and abbreviate many of the old ones. For example, MOUNT SY1: becomes M1, DISMOUNT SY1: becomes D1. New commands are added to print files, print the disk directory, change the disk label, create batch processing commands, enable the terminal scroll mode, copy files that contain hard read errors and show the free disk space. In addition, the disk directory is alphabetic, file dates remain unchanged when files are copied and a new date switch is added. Also included is a powerful file manager command which presents disk files one at a time and gives you a choice from 12 options to perform on the file. These include changing flags, viewing the first 24 lines, deleting and copying files and others. (HDOS)..... \$29.95

FRENCH, GERMAN, SPANISH and ITALIAN HANGMAN

Programs to help you build a basic working vocabulary in a foreign language. Each contains over 2000 words with their common English translations. Play the traditional game of Hangman or have the words presented in the Flashcard manner. Extensive use is made of the graphic capabilities of the terminal. All foreign words (including accent marks) are done in graphics as is the 'hanging man' himself. (Specify language and for HDOS, CP/M or CP/M-85)..... \$29.95

DISAS - A Powerful Disassembler

This is a disassembler program that generated source code suitable as input to an assembler. It provides a convenient way to find out how programs work and even allows you to modify them. This program expands text and decodes operating system calls. It also inserts LABEL references (in numerical sequence) into the source code so that object files can easily be understood and relocated. (Specify HDOS, CP/M or CP/M-85)..... \$25.00

The above products are available at most HEATHKIT stores or directly from SoftShop. Mail orders are sent postpaid by First Class Mail. Overseas orders add \$3.00. Payment must be in U.S. funds. Telephone orders are accepted.

35 Shadow Oak Drive
Sudbury, MA 01776
(617)443-9693

SoftShop

Circle #162 on Reader Service Card

Christopher Cleveland

I met some impressive students at Clarkson; one was a sophomore named Christopher Cleveland who's involved in a remarkable range of activities.

He's written "quick and dirty" Z100 versions of the games Breakout and Mad Bomber, as well as a graphics version of Adventure. He's also been working on a program to emulate Digital Equipment Corporation's popular VT100 terminal.

But even without that work, Cleveland would be keeping busy. For example, he runs a technical assistance clinic on the third floor of Clarkson's computer engineering building. His primary job there is to advise Z100 users (faculty and students) on how to interface their Z100s with peripherals, particularly printers.

As a personal project, Cleveland is working to develop a "game card" for the Z100. The S100-compatible card would have a sound-generator chip, a joystick interface, and a real-time clock.

Cleveland explained his design philosophy: "I'm primarily concerned with speed." To speed things up, he'll go so far as to "fly blind," without a monitor. "Sometimes I turn the computer on, tell it what to do, come back in 20 minutes, and turn the monitor on." This preoccupation with speed applies to Cleveland's academic career as well as his computing activities. He's a sophomore, but is on an accelerated program whereby he will graduate at the end of the '83-'84 academic year.

processor developed at Clarkson, will be sufficient for most users' purposes. However, Clarkson programmers have developed means to send data back and forth between a Z100 and the mainframe's word processor, a program called SCRIPT. If a Z100 user uploads files to the mainframe, SCRIPT can be used to perform sophisticated or unusual editing, text formatting, and printing operations.

Clarkson has ambitious plans for its future networking capabilities. "Down the road, we're looking for a true comprehensive data network, maybe even integrated with video and audio," said Richard Valente, director of the college's Educational Resource Center. (The ERC includes both the college's mainframe computers and the library.) The college will be following the development of networking capabilities and protocols very closely, with an eye towards Valente's ultimate goal: to make it possible to connect "every dorm room and every office" at Clarkson.

Future of the Z100s at Clarkson

When asked whether the Z100s made any difference in their decision to attend Clarkson, most of Clarkson's entering freshmen said that it was "a big plus," but not decisive. Some Clarkson students worried about the "digitheads," who will presumably continue to see the Z100s as "a big plus" for the next few years. But the likelihood is that fairly soon most colleges and universities will have some sort of group purchase program to make microcomputers easily available to students. Nevertheless, the distinction of being first

remains. Clarkson has been a true pioneer in bringing *personal* computing to higher education.

A coup for Zenith Data Systems

The sale of Z100s to Clarkson was an important coup for Zenith Data Systems. The most obvious benefit, of course, was that the sale raised Zenith's profile in the academic microcomputing market. Zenith Data Systems now runs an ad in *The Chronicle of Higher Education* with the headline: "Meet Dean Bray and the roommate he picked for all of Clarkson's incoming freshmen." And many institutions of higher learning have now made group purchase arrangements with Zenith, including the University of Michigan and eight other Michigan state universities, Tufts University, and the Kansas state university system. Most of these arrangements were made after Clarkson announced its program.

Has the Clarkson contract helped Zenith sell Z100s? "There's no doubt in the world" that it did, Zenith Data Systems Marketing Manager Andrew Czernek told *Sextant* in a telephone interview. Making the sale "gave us a lot of important information on important marketing aspects of putting microcomputers in colleges and universities." Furthermore, and perhaps most importantly, the Clarkson sale "established the credibility of the Z100" in the academic microcomputing market.

The sale may also benefit ZDS in some more subtle ways. For example, recent Clarkson graduates are working for companies such as Texas Instruments, RCA, Hughes Aircraft, Grumman Aerospace, Eastman Kodak, Digital Equipment Corporation, and, yes, IBM. Each year from 1987 on, Clarkson College of Technology will graduate a thousand Z100 owners, most of them engineers. They will migrate into American business and American society—and they will bring along with them an enthusiasm for Zenith microcomputers.

Additional Information

Clarkson College
Potsdam, NY 13676
315/268-6400

Ordering Information

GALAHAD and ZPILOT are each separately available from Clarkson for \$1,000 for a college-wide license, \$49 for a single copy, and \$29 each for quantities of 10 or more.

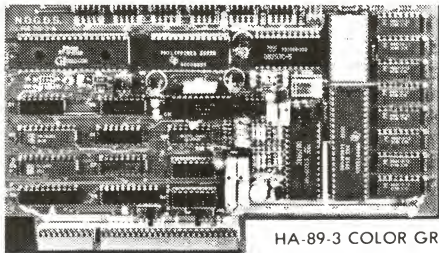
Graphics subroutines which give FORTRAN and Pascal the same color graphics capabilities as Z-BASIC are available for \$1,000 for a college-wide license, \$49 for a single copy, and \$29 each for quantities of 10 or more.

A terminal emulation package which enables the Z100 to emulate VT52 and Tektronix 4010 terminals is available for \$500 for a college-wide license. The screen-dump utilities are also included.

Clarkson software questions:
Dean David Bray
Clarkson College
Potsdam, NY 13676

H-8 and H/Z-89 ACCESSORIES

PUT COLOR GRAPHICS ON YOUR HEATH/ZENITH COMPUTER



HA-89-3 COLOR GRAPHICS BOARD

HA-89-3 COLOR GRAPHICS BOARD.....\$299.00

This board will expand your H/Z-89 computer to include color graphics and sound effects with support for both HDOS and CP/M. High level application support under GRAPH-PAC-II (see description below), and all for a price much lower than other boards offering much less! Uses the advanced TMS-9918A Color Video Generator which displays brilliant color graphic output on any video device accepting NTSC signals. Included is a documentation package which contains a distribution disk with sample programs and driver routines, a 275-page manual with detailed information on installing and using the HA-89-3, a schematic, manufacturers' data sheets for the major components of the board, and a list of vendors who have commercial software packages available for this board. The standard board includes:

- Eight Analog/Digital Converter Channels
- Sound Generation for Special Effects
- 16-Bits of Parallel I/O
- Three Counter Timer Channels
- Priority Interrupt Controller

Optional Features Include:

- Voice Synthesis using the VOTRAX SC-01A chip.....\$130.00
- Am9511A Arithmetic Processor (floating point and trig functions).....\$175.00
- Two 12-Bit Digital/Analog Converters.....\$110.00
- Joysticks (each).....\$ 14.00

Add \$15.00 extra if options are not purchased with basic board.)

Please specify operating system (HDOS or CP/M) and disk format (any standard Heath format).

HA-8-3 COLOR GRAPHICS BOARD.....\$299.00

Create color graphics and sound effects on your H-8 computer. Supports HDOS and CP/M and high level applications with GRAPH-PAC-II (see description below). Uses the advanced TMS-9918A Color Video Generator which displays brilliant color graphic output on any video device accepting NTSC signals. The programmable sound generator makes a wide variety of sounds. Included is a documentation package which contains a distribution disk with sample programs and driver routines, a 250-page manual with detailed information on installing and using the HA-8-3, a schematic, manufacturers' data sheets for the major components of the board, and a list of vendors who have commercial software packages available for this board. The standard board includes:

- Eight Analog/Digital Converter Channels
- Sound Generation for Special Effects
- 16-Bits of Parallel I/O

Optional Features:

- Am9511A Arithmetic Processor (floating point and trig functions).....\$175.00
- Joysticks (each).....\$ 14.00

Please specify operating system (HDOS or CP/M) and disk format (any standard Heath format).

JOY-1 JOYSTICKS.....(each) \$ 14.00

For use with the HA-89-3 and HA-8-3 Color Graphics Boards described above. Please specify for which board you will be using it.



NOW YOU CAN INCORPORATE
H/Z-89 I/O CARDS
INTO YOUR H-8 SYSTEM!!!!!!

HA-8-89 BUS CONVERTER.....\$ 89.00

This card allows incorporation of H/Z-89 cards into your H-8 system with the following features:

- H/Z-89 card fits into H-8 cabinet
- One converter per H/Z-89 card
- Standard Heath ROM addressing

H-8 MUSIC SYNTHESIZER SYSTEM.....\$ 89.00

Expand your H-8 computer to include the latest pop hits! This board connects to your stereo system with two shielded cables (included). A true D/A converter provides excellent 27.5-3300 Hz frequency response, up to 9 harmonics. 4-part harmony in stereo. Enter any song, right from sheet music. Full documentation included. Requires min. 24K memory, H-17 floppy, terminal. Please specify operating system (HDOS or CP/M) and disk format (any standard Heath format).

OPTIONAL 8-VOICE MUSIC COMPILER.....\$ 39.00

Allows your system to produce 8-part harmony in stereo rather than 4-part described above. Requires 4 MHz Processor. May also be ordered separately for existing HA-8-2 boards.

GRAPH-PAC-II.....\$ 39.00

A software support package for the HA-89-3 and HA-8-3 Color Graphics Boards described above.

- Supports calls from:

ASSEMBLY LANGUAGE (requires M-80)
BASIC-80 (interpreter or compiler)
TINY PASCAL
PASCAL/MT+
FORTRAN-80
COBOL-80
C/80 Ver. 2.0 (requires M80 and L80)

- Primitives and high level support
- Generates circles, lines, points, characters and bar graphs
- High speed object movement and collision detection
- User definable character fonts

Package includes your choice of one of the above languages. Additional languages may be ordered for \$15.00 each. Please specify language(s), disk format and operating system.

PASCAL/MT+ for HDOS.....\$350.00

Contains six major components: compiler, linker, debugger, disassembler, librarian and distribution package. The recommended environment is 64K of memory (the Pascal/MT+ compiler will use the lower 8K for additional symbol table space), three 100K disks or two extended density disks.

- Supports entire ISO standard (DPS/7185)
- Includes variant records, sets, record files and procedure passing
- Modular compilation with external variables
- Overlays and chaining through programs
- Interrupt procedures and absolute variables
- Inline assembly code
- Generates native Z80 or 8080 Code.

Available in any Heath format, please specify.

**NEW
ORLEANS
GENERAL
DATA
SERVICES**



Ordering Information: Products listed are available from NOGDS, 7230 Chadbourne Drive, New Orleans, La. 70126. Check, Money Order, VISA or MasterCard accepted. Phone orders call (504)241-9495. Add \$5.00 shipping (VIA UPS unless otherwise specified).

H8, H89 and HDOS are registered trademarks of Heath Corporation, Benton Harbor, Michigan. CP/M and PASCAL/MT+ are registered trademarks of Digital Research, Inc. Fortran-80 and COBOL-80 are registered trademarks of Microsoft.

GRAPHICS

H/Z-19* The Imaginator *H/Z-89

\$445.

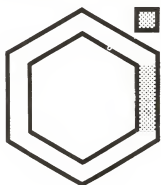
ASSEMBLED
AND TESTED



Professional Graphics at Practical Prices

IN USE THROUGHOUT INDUSTRY, EDUCATION AND GOVERNMENT

- High Resolution 504 x 247
- Accessible through any high level language FORTRAN, Pascal, BASIC Etc.
- Onboard Microcomputer eliminates processing load on host.
- Source Code Available
- Rich Graphics Instruction Set
- Mix text and graphics
- Tektronix® 4010-4014 Compatibility Option with GIN Mode
- Comprehensive Documentation Includes numerous examples
- Fully buffered for Asynchronous Operation
- All original H/Z features remain intact
- Low Cost - \$445. complete, Kits from \$215.



Cleveland Codonics, Inc.
P.O. Box 45259 Cleveland, OH 44145 (216) 327-6405

Tektronix® - Registered Trade Mark of Tektronix Inc.

Drawing on Your Heath/Zenith Computer: Ed-A-Sketch

Ed-A-Sketch creates and saves attractive screen displays using the Heath/Zenith graphics character set.

Lee C. Syer

Have you ever wanted to create a graphics display or an attention-getting message on your computer? Usually, it takes many hours to construct things like this from scratch using BASIC or assembly language. They are difficult to produce at best.

Ed-A-Sketch, by Gail Halverson of The Software Toolworks, has changed all that. This graphics package makes light work of creating graphics pictures, screens for menus, extra-large letters for

The Ed-A-Sketch package is designed for use with the H/Z89 or the H8 with an H/Z19 terminal. It comes ready to go under either the Heath Disk Operating System (HDOS) with at least 32 kilobytes random-access memory (RAM), or CP/M with at least 40K RAM.

The program can be used to create images on the screen using the character set available with the '19 and '89: both letters and graphics characters, both regular and inverse video. This restriction to the Heath/Zenith character set is one of the few limitations of Ed-A-Sketch that I have found. Of course, the other side of the story is that it takes your terminal's graphics capability as far as it can without actually adding a graphics board.

Rectangular areas of the screen can be filled with any of the available characters. Lines can be drawn horizontally or vertically, and portions of any screen can be picked up and moved around. Whole CRT screens and portions of screens can be saved to disk for use with a choice of programming languages: Benton Harbor BASIC, Microsoft BASIC, assembler, or C/80. There's also a special Picture format for recall with Ed-A-Sketch or the HDOS TYPE command.

Set-up

The Ed-A-Sketch set-up procedure is very simple. After a backup copy is made, the SKETCH.ABS (which is the actual Ed-A-Sketch) program and several demonstration picture files are copied to a SYSGENED disk. The system is now ready to sketch. SKETCH is called up, and the operator is prompted to either sketch a new picture or recall an old picture file.

For starters, it is a good idea to use one of the demonstration files, which are already on the disk. These can be used for experimentation. The screen shown in Figure 1 is the ALPHABET file, which can be used during the example lesson to demonstrate the various aspects of

the Ed-A-Sketch program. The larger letters have actually been constructed using the graphics characters from the Heath/Zenith system. The letters can be picked up individually or in groups and moved to different positions on the screen in regular or inverse video. In Figure 1, the "ED-A-SKETCH" shown below the alphabet was created by picking up the appropriate letters from above and moving them down to the bottom of the screen. Everything is done very conveniently using the cursor controls and the special function keys.

It is very exciting the first time a whole area of the screen is picked up and moved completely. You begin to realize just how easy this program will make your graphics computing from here on.

Cursor positioning

The cursor is moved around the screen by using the arrow function keys on the keyboard number pad. The TAB key functions as normal, with the ESC key causing a reverse of the TAB, or a backtab. The DELETE and BACKSPACE keys perform their normal functions, with an exception to be discussed later. The HOME key takes the cursor to the upper left corner from any position on the screen.

A shifted arrow moves the cursor to the end of the screen in the designated direction. The time for the cursor to traverse the screen without this last

Photo Courtesy of Lee C. Syer



Figure 1: The alphabet file from Ed-A-Sketch. The letters forming "ED-A-SKETCH" were picked from the top and put at the bottom.

messages, and many otherwise time-consuming tasks involving screen control.

Ed-A-Sketch has many features that make it easy to work with. An especially nice one is the "second-chance" or oops! key. This would be a nice addition to any software package. More on the oops! key later.

The Ed-A-Sketch package has proven to be very useful to me, and I have enjoyed working with this program over the past few months. As I have become more accustomed to using it, I have learned that this program makes quick work of creating menus and graphics for use or display with nearly any type of programming format the user might need. I have been using Ed-A-Sketch to produce attractive and interesting menus for BASIC programs that are used in a small business application. It is, I feel, one of the most useful programs in my software library.

Photo Courtesy of Lee C. Syer



Figure 2: This is a message that was incorporated into a BASIC program. The program flashed a welcome to some visiting friends.

feature can seem like forever. It is nice having what I will call the quick cursor. The cursor movements are very rapid and easy.

Defining areas of the screen

Large and small portions of the screen can be defined, filled (painted), or separated either as rectangles, squares, or lines. There is no provision for angular lines (e.g., 45 degrees) or circularly defined areas. This would be a nice feature, but I feel that for the price, this program does quite a bit. It would almost be asking too much.

The defining of areas is accomplished by first establishing a starting point by hitting the ENTER key on the number pad. An X appears on the screen in the cursor position, and remains there while the cursor is moved to define a rectangular area. These areas can be defined quickly and easily with the quick cursor described above.

The areas defined can then be manipulated in different ways including moving them around, filling them with graphics characters or letters, or saving the individual areas to a disk. If an area of the screen has a design or picture you want repeated somewhere else on the screen, you can pick it up and move it wherever desired using the same area-define function.

As I said, the large letters in the

demonstration picture (the ALPHABET file) can be picked up individually and moved to other locations on the screen to spell out messages in large letters. The message in Figure 2 was designed quickly for some friends who visited recently. It was used in a BASIC program to demonstrate my computer. The

The oops! key can be quite handy.

creative possibilities for filling in or painting and moving areas of the screen around are nearly endless.

IL, IC, DL, and DC

The keys on the number pad of the Heath/Zenith keyboard perform their stated functions: insert line (IL), insert character (IC), delete line (DL), and delete character (DC). They may also be used with the area-define function, for inserting and removing characters and spaces from the defined areas. Using these functions is one of the situations where the oops! key can be so handy.

If one of the delete features is used by mistake, the oops! key (which is actually the decimal-point [.] key on the number pad) will correct the error by restoring the screen to its previous condition. A warning though: this can be done only for the last keystroke made, and will not

help you if you have made more than one improper keystroke. It has saved me on more than one occasion.

Painting with Ed-A-Sketch

All of the Heath/Zenith function keys are used in Ed-A-Sketch. The fill-to-right (f2 key), fill-from-left (f2 key struck twice), fill-to-bottom (f1 key), and the fill-from-top (f1 key struck twice) are all quick ways to paint or fill an entire area on one side of the cursor or the other.

This function works quite simply. If the cursor were positioned in the middle of the screen, the *fill-from-left* would fill the screen from the left side to the cursor position with the next printable character hit on the keyboard. This only affects the line the cursor is on. The *fill-to-bottom* function would fill the entire screen below the cursor with the next printable character or graphics symbol typed.

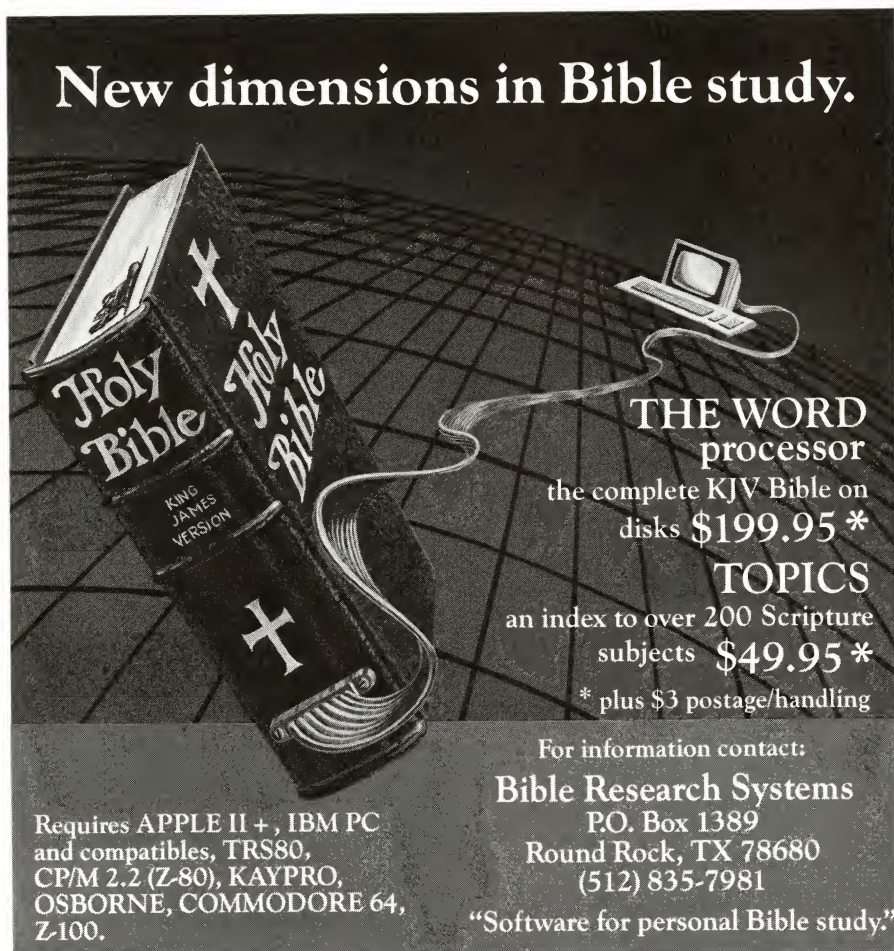
Again, the oops! key will function here and erase any painting which has been done by mistake. The painting keys also work with the area-define functions to paint those areas which have been defined with the X and the cursor.

There are two other keys which can be used in the painting mode: the ERASE key and the INVERT (f5) key. The ERASE key is used to erase the remainder of a line from the cursor to the end of the line, and will also erase an area defined by the area-define function. The INVERT key (f5) will cause the entire screen or a defined area to be displayed in inverse video. The INVERT function is a lot of fun to play with, as the negative image of the screen is displayed after this key is struck. I have designed a couple of creatures for a video display, and their whole disposition seems to change when shifted from normal to inverse video. (See Figure 3.)

Cutting and pasting

The Ed-A-Sketch functions also allow you to pick large and small sections of the screen as described earlier. The area to be picked is defined just as before with the ENTER key (an X is displayed on the screen) and the cursor is moved to define an area. After the area is defined, the PICK (red) key is struck and the defined area is stored in a buffer for future use. When the PUT (white) key is used, the stored area in the buffer is deposited on the screen with the upper left corner at the current cursor location. The PUT function may be repeated as often as needed. The information in the buffer is placed wherever you want it on the screen.

The defined area may also be saved to a disk and recalled to a specified location on the screen at a later date. This cut and paste function and the ability to



New dimensions in Bible study.

THE WORD processor
the complete KJV Bible on disks **\$199.95 ***

TOPICS
an index to over 200 Scripture subjects **\$49.95 ***
* plus \$3 postage/handling

For information contact:
Bible Research Systems
P.O. Box 1389
Round Rock, TX 78680
(512) 835-7981

Requires APPLE II +, IBM PC and compatibles, TRS80, CP/M 2.2 (Z-80), KAYPRO, OSBORNE, COMMODORE 64, Z-100.

"Software for personal Bible study."

Circle #143 on Reader Service Card

Heath/Zenith Users— Get the Information You Need:

Read the only independent magazine with a specific focus on your system—

SEXTANT the Independent Magazine for the Entire Zenith Computer Community.

Whether you use an H/Z100, H/Z89, Z90, H88, or H8—you'll find articles in every issue which apply to your system.

Explore CP/M, HDOS, and Z-DOS capabilities through *Sextant's* articles. Applications, programs, compatible hardware and software, and the latest developments in the Heath/Zenith community are among the topics included in *Sextant* on a regular basis.

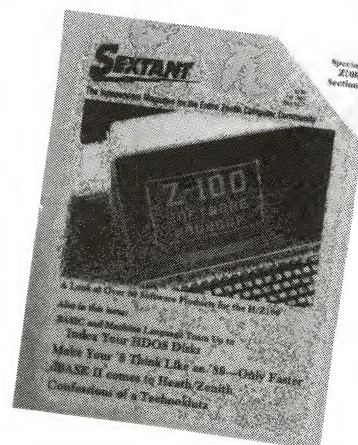
Carefully edited to bring you a broad coverage of the Heath/Zenith community, *Sextant* features include:

- A broad range of "how-to" articles which will help you implement system enhancements as you need them. Read about how other users have altered their systems to suit their needs—and how you can do the same.

- Reviews of products from Zenith and independent suppliers will help you sort out the questions you have about hardware and software options you might consider.

- Short program listings, including utility programs and games, give you practical options which you can implement immediately.

- For your system needs, you'll find **over 90 advertisements** of compatible products in each issue of *Sextant*. Many advertisers find the independent magazine for the entire Zenith computer community the most direct medium to market their Heath/Zenith-specific products—you'll find independent suppliers with products you won't find advertised elsewhere.



- And, so that you'll be informed of the latest progress and innovations in *your* Heath/Zenith community, *Sextant* provides extensive **coverage of community affairs**. Read about major events in the Heath/Zenith community, as Heath/Zenith users meet to discuss recent developments and future projections. Specific companies and individuals are highlighted as they make significant contributions to the Heath/Zenith community.

A Whole World of Information About Your System, Available to You Now.
Start your subscription today! Call Toll Free: DATATEL™ 800/341-1522

(M-F 8 a.m.-9 p.m. Eastern Time)

Or send in the coupon below to: Sextant, Dept. S8, 716 E Street S.E., Washington, DC 20003 • 202/544-0900



Your satisfaction with Sextant is guaranteed. If at any time you're not satisfied just let us know and your money will be refunded—in full.

Send me:

- ☐ 12 issues (2 years) for \$29.91 (\$34.50 to Canada)
 - ☐ 8 issues for \$19.94 (\$23.00 to Canada)
 - ☐ 4 issues for \$9.97 (\$11.50 to Canada; \$14.00 overseas via surface mail, \$35.00 via air mail)
 - ☐ Payment enclosed (Checks must be in U.S. dollars payable on a U.S. bank.)
 - ☐ Bill me
 - ☐ Charge my: ☐ Visa ☐ MasterCard (MC code # _____)
- Card # _____ Expiration date _____

Name _____

Address _____

Please allow 6 to 8 weeks for delivery of your first issue.

Sextant, Dept. S9, 716 E Street S.E., Washington DC 20003

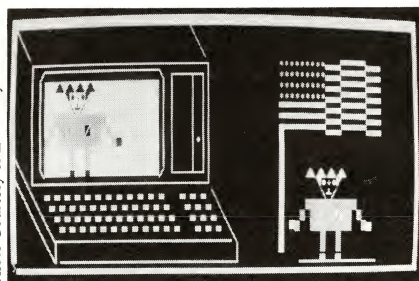


Figure 3: These are the creatures created with Ed-A-Sketch with a background created the same way. One creature is in regular video, the other in reverse video.

save a defined area are two of the most powerful features of Ed-A-Sketch. These features can be used to create slowly moving pictures with BASIC and assembler programs. The PICK and PUT functions are very useful in creating displays where areas are to be repeated. This is especially useful where detailed work has been done in one part of the screen and you do not want to waste time repeating that work. It is a simple and time-saving matter to PICK and PUT portions of the screen.

How to SAVE work

SAVE (the f4 key) is the link between the Ed-A-Sketch pictures which have been created and the disk on which they are saved. There are four formats for saving the pictures you have created: Benton Harbor BASIC; Microsoft BASIC; assembler; and a special Picture format which enables the picture to be recalled for viewing either as an Ed-A-Sketch picture or by using the TYPE function of HDOS.

It is important to note that pictures cannot be used again with Ed-A-Sketch unless they have been saved in the Picture mode. Therefore, if the sketcher wants to save the picture for future reference, it must be saved in Picture

format first, recalled, and then translated to one of the other languages.

The assembler (ASM) files are stored in assembly-language format, in a series of "DB" statements, ending with a null character (0 byte). Programs saved in the ASM format can be used in assembly-language programs, or in C/80 programs using the #asm directive.

Both of the BASIC formats are similar. The picture files are stored as a series of print statements ending with a RETURN so pictures can be called as subroutines. The BASIC files all start at a specified line number (9000), and can be merged with programs in which the pictures are needed. This is a very nice aspect of the Ed-A-Sketch program, as it saves countless hours of determining escape sequences for the creation of graphics displays in your BASIC programs.

OUTPATIENT NURSING HOME HEALTH SERVICE
WEEKLY SERVICE REPORT

MENU FOR WEEKLY REPORT

CHANGE STAFF NAMES OR WAGE
ADD NEW STAFF
DO THE WEEKLY REPORT
PRINT THE WEEKLY REPORT
EXIT PROGRAM

PICK ONE OF THE ABOVE-WIT RETURN

Figure 4: Menus such as this one are easy to create and modify as necessary using Ed-A-Sketch. They can be merged into BASIC programs after storage as BASIC statements.

The menus which I have designed for business programs have been put together in minutes using Ed-A-Sketch. They can then be saved for merging with programs at a later date. (See Figure 4.) The ease with which these

menus and graphics are created and saved make the programmer's life much simpler.

Advanced features of Ed-A-Sketch

There are two features of Ed-A-Sketch which I have not found occasion to use except for experimentation. These are termed advanced features in the manual. I have experimented with both of them, and understand where they could be useful in some programming applications. The two features are as follows: the saving of small portions of the picture using *relative positioning* of the cursor; and the concept of *holes* and *blanks*.

The SAVE (f4) key may be used to save small portions of the screen to disk. These saved portions, however, must be positioned on the screen during recall from disk using relative positioning of the cursor. The normal full-screen pictures are all referenced to the top left corner of the screen. The smaller portions of a picture have no reference point and are stored in a format called Relative Positioning.

This means that the recalled portion of a picture must be given a reference point from which the display will start. This gives the programmer the option of positioning the recalled portion of the picture at any point on the screen simply by positioning the cursor at the point where the computer is to begin displaying that portion of the picture.

This feature can be used to create the illusion of slow motion on the screen by having a portion of the screen overwritten by the new picture portion. This feature gives the programmer a lot of flexibility in creating visual effects using "motion" on the screen.

The holes and blanks features refer to the actual state of a character position on the screen. The BACKSPACE and SPACE keys create blanks. Blanks, of course, are not printed, but are used in Ed-A-Sketch to create white or black backgrounds. A hole is created in the screen by DELETE and ERASE keys, and produces the apparent absence of any character.

This means that it is possible to position a picture or portion of a picture on top of a pre-existing picture on the screen. The picture underneath will show through the *holes* in the top picture, but will not show through the *blanks*. This feature of Ed-A-Sketch can be used to create overlays on the screen with only some portions of the underlying picture showing through. There is a special function key to show which areas of a picture are holes and which are blanks.

The holes and blanks can be used to create the appearance of a changing computer display, as in Figure 3. This would be done by positioning the printing or picture to be changed in a hole in the center of the larger picture, and

COMSYS

Modem Communication Software
For HDOS \$29.95

- *Communicates with host computer by direct hookup or modem
- *110-9600 baud communication
- *Interrupt driven—never misses a character
- *Sends all keyboard characters including <break> key
- *Sends and receives files in ASCII, binary, and can emulate ADDS, Microdata, etc. terminals
- *25th line command menu
- *Source listing included
- *Auto logon

Wayne Reses
(215) 387-3589

Box 392, 3820 Locust Walk, Phila., PA 19104
Call/Write for free documentation
Not compatible with H8-5 card
Requires H19/H89

TRI-D

3-Dimensional Graphics
for the H/Z100*

- Design complex objects. Combine detailed objects into scenes or pictures.
- Rotate, move, or scale objects, scenes, or pictures. Save data on disk.
- View picture from front, top, side, or from perspective.
- Supports color monitor (optional).
- Supports light pen (optional).

\$39.95

Available at your Heathkit Electronic Center or send your check for \$39.95 to:

Proteus Software
2648 Goddard Rd.
Toledo, Ohio 43606

*H/Z100 is a Zenith Trademark

PRICE BREAKTHROUGH

Super Sale on New Disk Drives

Starting at **\$169.00!**

Tandon — Siemens — Remex — MPI — Teac — Shugart — Tabor

40 or 80 Tracks — Single or Dual Head — New 3½" Drivette™

Our Disk Drives Are Capable Of Single And Dual Density Operation

The **NEWEST** Technology Capable Of Operating On Most Popular Computers

Drive a Hard Bargain!!™ — 5 M.B.-20 M.B. Complete Systems from \$999.95

Diskette Breakthrough — 10 Pack in Library Case — \$18.95 NEW LOW PRICE

**Since We Are Always Finding Ways To Save You Money,
Please CALL For Our Most Current Pricing.**

TOLL FREE ORDERING

1-800-343-8841

GENERAL AND TECHNICAL

1-617-872-9090

Model I/III/IV Drives (0 1 2 3)	starting at \$169.00	
Color Computer Drive (0 1 2 3)	\$ Call Toll Free	
Apple/Franklin Compatible Add-On Drives with Case & Cable.	\$219.95	NEW LOW PRICE
Apple/Franklin Compatible Drives with Controller	\$259.95	
Model I/III/IV Memory Upgrade	Call Toll Free	
Printers — Daisywheel/Dot Matrix	\$ Call Toll Free	
Diskettes in Library Cases	\$18.95	NEW LOW PRICE
Cases and Power Supplies — (Single-Dual-1/2 Height)	starting at \$44.95	
Printer Buffers 8K to 512K	starting at \$143.95	
Percom Double Density Controller (Model I)	\$ Call Toll Free	
Holmes Model I/III Speed-up Mod-VID/80	starting at \$90.00	
Color Computer Printer Interfaces	starting at \$29.95	
Cables — Printer/Disk Drive	starting at \$23.00	
DOSPLUS	\$ Special Prices	
Repair Services Now Offered — FAST Turn-a-Round	\$ Call Toll Free	

Warranty on Disk Drives — 6 Months — Extended Warranty \$ Call Toll Free

SOFTWARE SUPPORT, INC.

One Edgell Road, Framingham, MA 01701 (617) 872-9090

Hours: Mon. thru Fri. 9:30 am to 5:30 (E.S.T.) Sat. 10 am to 4:30 pm

DEALER INQUIRIES INVITED.

TERMS:

M.C./Visa/Amex and personal checks accepted at no extra charge.
C.O.D., please add \$3.00.
Shipping: Please call for amount.
Not responsible for typographical errors.

© Copyright 1983

CANADA
MICRO R.G.S. INC.
751, CARRE VICTORIA, SUITE 403
MONTREAL, QUEBEC, CANADA, H2Y 2J3
Regular Tel. (514) 845-1534
Canadian Toll Free 800-361-5155

Service! Service!

All in stock products are shipped within 24 hours of order. Repair/Warranty service is performed within 24 hours of receipt unless otherwise noted. We accept C.O.D., foreign and APO orders. Schools and D&B corporate P.O.s accepted.

changing only the portion of the display inside the hole. This feature of Ed-A-Sketch has lots of possibilities.

The manual

The manual which accompanies the Ed-A-Sketch disk is sufficient. It is an 18-page manual with easy-to-follow instructions and examples. There are explanations of each of the different Ed-A-Sketch functions, and references are made to precautionary measures which must be taken while running the program.

After the introduction, there are instructions for beginners in the front of the manual. These instructions take the new sketcher through the rudiments of Ed-A-Sketch, going step by step. This guided tour is very helpful the first few times through, as there are quite a few keys and functions to learn. After the guided tour, there is a Reference Manual section which describes each key and function in depth. This section gives the working details on each of the special function keys on the Heath/Zenith keyboard. For example, the Reference Manual gives the following description of the BLUE key:

"GRAPHICS The BLUE key toggles the graphics mode of the terminal. If regular character keyboard input is in effect, the graphics character input mode is entered. If the graphics character input is in effect, regular input is entered."

I found the instructions generally clear and easy to understand.

The final page of the manual is a quick reference table of each key and the functions which it can perform. (See Table 1.) This table can be useful for refreshing your memory after the initial learning period.

The manual is adequate, but could be done with a little more polish. It does get you started quickly, and all the information you need is there. The material is presented in an easy-to-read style, and is understood quickly.

Ed-A-Sketch overall

For the price of \$29.95, Ed-A-Sketch is a real bargain. As I stated earlier, Ed-A-Sketch has become one of the most useful utilities in my software library. I have enjoyed using it and, most important, it has saved me hours of work. I feel that if a piece of software accomplishes both of the above, and can also be just plain fun, it is well worth recommending.

I have also used Video Artist from Newline Software, and find the programs comparable. Ed-A-Sketch has become my mainstay, however, because I used it first and have become more familiar with it. Both of them are fine programs and do an excellent job.

One of the few drawbacks to Ed-A-Sketch is that there is no provision at this time for printing the screen to a printer.

Key	Function Name	Function
F1	Fill To Bottom	*Fill to end of screen
F1-F1	Fill From Top	*Fill from the beginning of screen
F2	Fill To Right	*Fill to right end of line
F2-F2	Fill From Left	*Fill from left end of line
F3	Chart	Display graphics chart
F3-(.)	Erase Chart	Erase graphics chart
Enter F3	Display Holes	Toggle Display Blanks/Holes Mode
F4	Save	Save file
F5	Invert	*Inverse video (portions also)
Erase	Erase	*Erase (portions also)
Blue	Graphics	Toggle graphics mode
Red	Pick	Pick portion of screen
White	Put	Put picked area at cursor
ESC	Backtab	Back one tab position
IC	Insert Character	*Insert (#) characters
DC	Delete Character	*Delete (#) characters
IL	Insert Line	*Insert (#) lines
DL	Delete Line	*Delete (#) lines
Home		Home cursor
Up		Cursor up one line
Down		Cursor down one line
Right		Cursor right one position
Left		Cursor left one position
Shift-Up		Cursor to top of screen
Shift-Down		Cursor to bottom of screen
Shift-Right		Cursor to right edge
Shift-Left		Cursor to left edge
Enter		Enter define area mode (area)
Enter-Enter		Enter define area mode (line)
(.)	Oops	Cancel designated function
(0)	Inverse Video	Toggle inverse video mode

Note: Functions marked with an * may be applied to defined areas and may be cancelled by the Oops key. In the left column, the parentheses indicate keys on the numeric keypad.

Table 1: A quick reference for key functions. It is very handy after the rudiments of Ed-A-Sketch have been mastered.

Mention is made of this in the manual with a reference to possible use of the H/Z25, and the Epson MX-80 printers. The H/Z25 printer, as well as the Epson MX-80, should be capable of printing graphics from the screen. However, the '25 would need the addition of a new read only memory (ROM) chip in order to handle reverse video.

Another option is the 99G printer from Micro Peripherals, Inc. (M.P.I.). It should be able to handle all the graphics easily. However, you would have to buy or write a device driver for it to work with HDOS. Depending on the choice of printer, however, I think that most problems could be worked out by an enterprising user.

As I have stated, the only other real limitation is the lack of resolution imposed by reliance on the Heath/Zenith graphics characters; i.e., do not expect high-resolution graphics. And finally,

there is the manual which I have described as adequate but not fantastic.

I do hope that Ms. Gail Halverson and the folks at The Software Toolworks can continue to produce such fine inexpensive software for the Heath/Zenith systems. I would like to make a suggestion to them, however: get to work on a universal OOPS! button. It would sell like hotcakes, because as long as there are computer programmers, somewhere, sometime, someone is saying "Oops!!!!"

Ordering Information

Ed-A-Sketch, \$29.95
Specify disk format: 5" HDOS or CP/M, hard- or soft-sectored; also standard 8" single-density CP/M.
The Software Toolworks
15233 Ventura Boulevard
Suite 1118
Sherman Oaks, CA 91403
213/986-4885

Shakespeare had every gift for writing. Except one.

The FinalWord.

As the Bard himself would have said, "that which we call word processing will never be the same."

Because The FinalWord turns tough writing jobs into play. With an arsenal of word processing commands so powerful, you're free at last to concentrate solely on having great ideas. While The FinalWord concentrates on making them look good on paper. You never format. You only think.

In fact, one reviewer called The FinalWord "the thinking person's word processor."

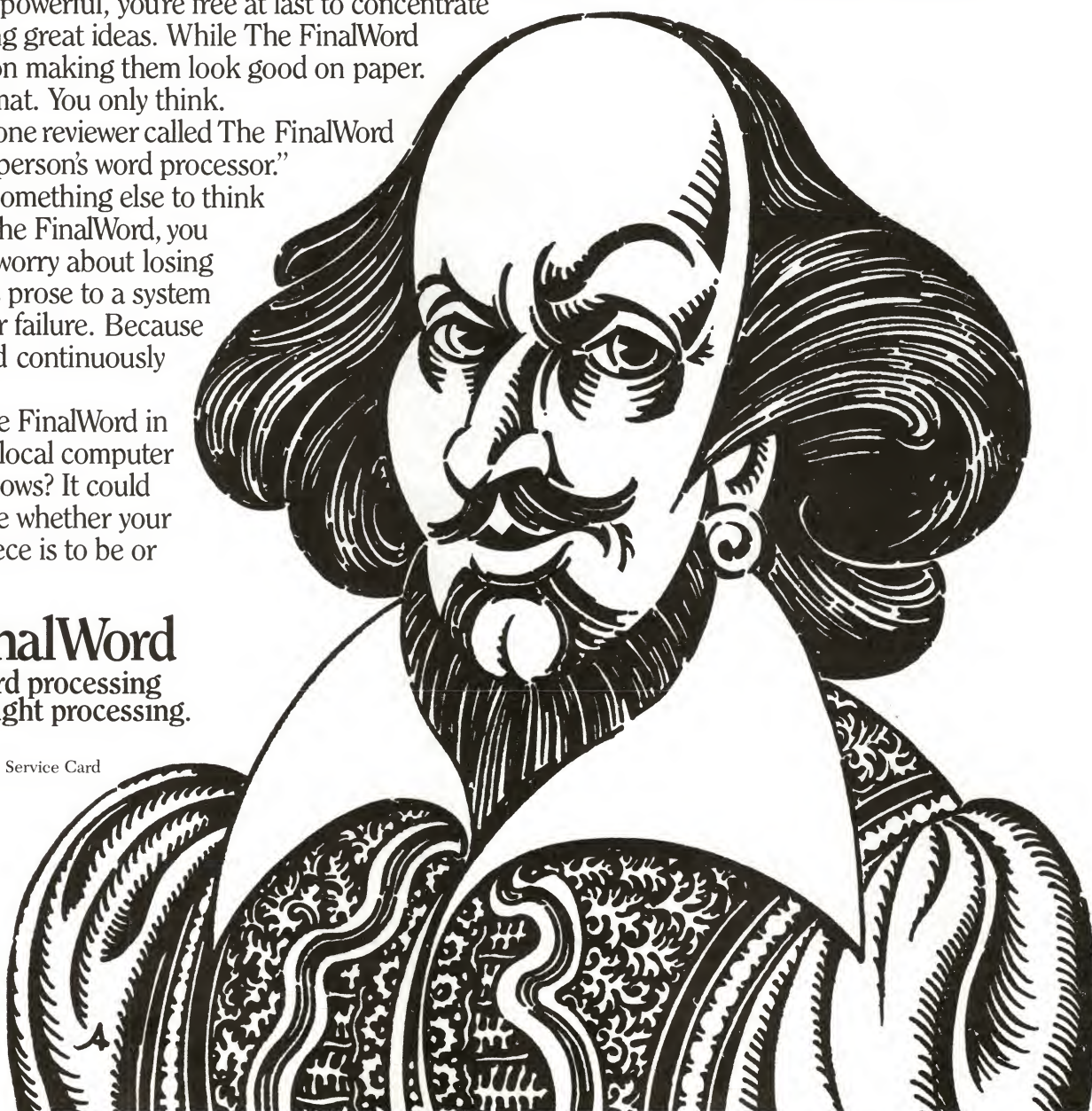
Here's something else to think about. With The FinalWord, you never have to worry about losing your deathless prose to a system crash or power failure. Because The FinalWord continuously saves it.

See The FinalWord in action at your local computer store. Who knows? It could even determine whether your next masterpiece is to be or not to be.

The FinalWord
Finally, word processing
becomes thought processing.

Circle #155 on Reader Service Card


Mark of the Unicom
222 Third Street
Cambridge, MA 02142
(617) 576-2760





if you don't like wasting money
1-800/241-4783

COMPUTERS

	List	CFX
Televideo Computers		
TS 803	2495	1970
TS 1603	2995	2425
TS 802	3495	2695
TPC 1	1995	1850
Corona Computers		
PC11	2595	1995
PC21	2995	2299
Actrix All-in-One Computers		
SS/DD		2190
DD/DD		2590

* Both Actrix computers include tractor feed and external monitor.

PRINTERS

	List	CFX		List	CFX
Okidata Printers			Mannesmann Tally Printers		
80 P/S	449	325	MT 160L	798	599
82A P/S	549	390	MT180L	1099	815
83A P/S	899	575	Spirit	399	320
84 PAR	1395	990	NEC Printers		
84 SER	1495	1075	3510	1895	1410
92 PAR	699	459	7710	2895	1930
92 SER	799	552	Transtar Printers		
93 PAR	1249	715	130P PAR	895	725
93 SER	1349	780	130S SER	950	765
2350 PAR	2695	1995	315-Color	599	519
2350 SER	2845	2145	Tractor for 130P/S		130
2410 PAR	2995	2295	Qume Printer		
2410 SER	3145	2445	11/40	1776	1432
Tractor for 80/82A		50			

PERIPHERALS

	List	CFX
Plotters		
Amdek DXY Multi Pen		642
Mannesmann Tally Pixy III		665
Modems		
Rixon 1200	499	459
Hayes 300	279	215
Hayes 1200	699	499
Televideo Terminals		
910	699	579
925	995	745
950	1195	968
970	1495	1090

Because you've been waiting for the right hard disk for your microcomputer, we've built the CFX-16™ and CFX-10™ at a price to make you stop waiting.

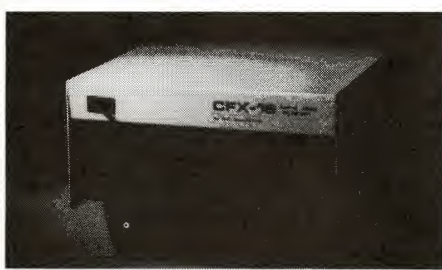
CFX Disk Systems makes choosing a hard drive for your micro a very easy job. Now all you need is virtually any Z80 or 8080 based micro and a copy of Digital Research's MOVCPM* utility for your machine. You can add 10 or 16 megabytes of quick power to your machine within minutes.

Step by step instructions are included with the package, along with all software necessary to patch the drive to your CP/M* 2.2 operating system. It's as easy as A-B-C.

Each system is thoroughly tested and certified in our assembly shop and we offer a 1 year swap-out service guarantee on drive and all interface circuitry. Additionally, we have technical help available, by phone, should you have any questions during start up.

The finest quality components are used in our systems. We have neither cut corners nor compromised quality for price. The disk drive we use is the same drive used by IBM and other quality micro manufacturers. If you want more information, call us. We'll be happy to help you get into the hard disk movement.

*A registered trademark of Digital Research.



CFX-10 and 16 systems are complete packages ready for use with your system. No assembly is required except for connection to your computer. These systems have been in use for over 1½ years with Z80 and 8080 computers.

Hard Disk Systems		List	CFX
CFX-10	10MB	2550	1995
CFX-16	16MB	2950	2395

TERMS: We Accept MC, VISA, Wire Transfer, Ax, Certified Check, Personal Check (allow 2 weeks to clear). No surcharge for credit cards. Georgia residents, add applicable sales tax.

SHIPPING: Our prices are rock bottom, so you need to add shipping and handling allowance of \$3 minimum up to 5 lbs. Over 5 lbs. actual UPS ground rate will be charged. UPS Blue, Red, and Federal Express available at your request.

PRICES: All prices subject to change.

SOFTWARE

dBase II	700	435
Friday!	295	207
Wordstar	495	289
Mailmerge	250	160
WS/MM	645	379
Multipan-80	275	195
Random House Dictionary		50
Infocomm Communications Program		180
WordStar Professional Package	895	399

(Available in all H/Z formats)

STANDBY POWER

Soft Standby Power Systems		
200VA 20 min backup		
	519	465
400VA 8-10 min backup		
	719	625

MONITORS

Amdek		
300G 12" Green		159
300A 12" Amber		170
Color II 13" RGB		445
Color IV 13" High Res		790
NEC		
JB1260 12" Green		124
JB1205 12" Amber		164
JC1203 12" RGB		642

SUPPLIES

Paper		
9½ x 11" 18# Micro Perf 800 Sheets		15
14½" x 11" Green Bar 900 Sheets		20
Ribbons		
Okidata		
80, 82, 83, 92, 93		3
84		9
Mannesmann Tally		
MT 160L		11
Transtar		
130 Mylar		5
Diskettes		
Opus 7 year warranty		
Price per box of ten		
SSSD hard sector		25
SSSD 5¼"		26
SSDD 5¼"		28
DSDD 5¼"		35
DSDD 96tpi 5¼"		40
SSSD 8"		25
SSDD 8"		30

MAIL ORDER:

P.O. Box 920152
 Norcross, GA 30092

HOURS: 10-6 M-F
 12-6 SAT

CALL TOLL FREE:
 800/241-4783

In Georgia call:
 (404) 255-3811

COMING SOON:
 Mail Order by Modem.

Circle #150 on Reader Service Card

Optimizing Benton Harbor BASIC's Numerical Output

Understanding how B.H. BASIC stores numbers enables you to improve the precision and format of their display.

Charles W. Rogers

An early use many of us make of our Heath/Zenith computers is tracking financial items. Personal ledgers, expense accounts, net worth statements, and (of course) income tax records are very popular "first" applications. If we use Benton Harbor BASIC, we are likely to quickly confront two features which often needlessly discourage the budding enthusiast: B.H. BASIC does not provide a built-in mechanism to generate neatly aligned columns of numerical data. Furthermore, the number of significant digits of accuracy for arithmetic calculations is approximately 6.9.

These features do not impose serious barriers to the use of B.H. BASIC. We just need a routine to get around them. By understanding them, and through use of the procedures presented here, one can largely overcome these apparent limitations.

Illustrating the problem

To illustrate the features of Benton Harbor BASIC which we seek to work around is a simple matter. The program in Listing 1 can be prepared to print out two number series: the numbers between 9.5 and 10.1 in 0.1 increments; and those between 9,999.97 and 10,000.05 in 0.01 increments. This program produces the following output:

```
9.5
9.6
9.7
9.8
9.9
10
10.1
9999.97
9999.98
9999.99
10000
10000
10000
10000
10000
10000.1
```

A close look at the output produced on your screen or printer will reveal that

```
10 FOR X = 9.5 TO 10.1 STEP 0.1
20 PRINT TAB(5);X
30 NEXT X
40 FOR X = 9999.97 TO 10000.05 STEP 0.01
50 PRINT TAB(5);X
60 NEXT X
70 STOP
```

Listing 1: A Benton Harbor BASIC program to print out two number sequences: the numbers between 9.5 and 10.1 in 0.1 increments; and those between 9,999.97 and 10,000.05 in 0.01 increments.

the first character printed in each row is in column six, rather than column five as might be expected from the TAB(5) in lines 20 and 50. Also, the first column available for more printing on each row will be the second position after the last character of the number. This is because BASIC generates a gratuitous space at the beginning and end of all numeric fields.

More significantly, the columnar presentation is not consistent with our esthetic traditions. We would prefer the decimal points to be in line—not the leftmost characters, as they are here.

Sometimes decimal points are present—sometimes they are not. Most significantly, look at the values printed for numbers over 10,000. BASIC can easily accommodate values up to 1 with 38 zeroes after it. However, the number of significant digits in arithmetic results is limited. Hence, 10,000.01, 10,000.02, 10,000.03, and 10,000.04 are all regarded as "10,000.0"; and the trailing zeroes are suppressed. And 10,000.05 is rounded up to 10,000.1.

The two features we observe, then, are: first, the number of significant digits in a result is limited; and second, the B.H. BASIC PRINT command is not directly usable for pleasing tabulations of columnar data. The first of these features, limited significant digits, is inherent to most implementations of BASIC or any other computer language. The limit can be changed by use of double-precision arithmetic in some versions of BASIC. However, there is

always an upper limit. It is necessary for the programmer to know what the limit of precision is and work within the constraints. The second feature is easily accommodated by use of the algorithms presented later on.

Getting accuracy

Without going too deeply into the matter, we can still understand the significant digits issue. All numeric values are stored as "floating-point" numbers. Just as in newer calculators, there is no need to have the decimal point always occur at some fixed location. One byte is used for the number's "exponent." The exponent indicates where the "binary point" (as opposed to the decimal point) is to go.

The digits of the number itself, expressed in binary, are called the "mantissa." This uses three bytes. The first bit of the binary number, however, is a sign bit. Therefore, only 23 bits are available for the binary representation of the mantissa of the number.

These internal mechanics result in an upper limit of accuracy of six or seven decimal digits (depending on the value represented). For this reason, B.H. BASIC conservatively rounds all values to be printed to six decimal digits. The algorithms discussed later extract every last possible decimal digit of accuracy from the values. The guaranteed accuracy of the algorithms, however, cannot exceed the limits imposed by the mathematics of BASIC. Briefly, our upper limit will be 32,767.90 if we want


```

00100 OPEN "SY1:TEST01.DAT" FOR WRITE AS FILE #1
00110 PRINT #1, TAB(20);"SAMPLE RUN 1"
00120 PRINT #1,
00130 PRINT #1,
00140 Z=1.98
00150 GOSUB 9000:PRINT #1,
00160 Z=15
00170 GOSUB 9000:PRINT #1,
00180 FOR Z=23678.98 TO 33000 STEP 2000
00190 GOSUB 9000:PRINT #1,
00200 NEXT Z
00210 CLOSE #1
00220 STOP
09000 REM SUBROUTINE TO PRINT Z IN A DECIMAL ALIGNED FIELD.
09010 IF (ABS(Z)>32767.9)THEN PRINT #1,"OVERFLOW";:RETURN
09020 Z3=INT(ABS(Z)+.005)
09030 Z3$=MID$(STR$(Z3),2,LEN(STR$(Z3))-2)
09040 Z4=5-LEN(Z3$)
09050 FOR Z5=0 TO Z4
09060 PRINT #1," ";
09070 NEXT Z5
09080 PRINT #1,Z3$;
09100 PRINT #1,".";
09110 Z4=INT(((ABS(Z)+.005)-Z3)*100)
09120 IF (Z4<10)THEN PRINT #1,"0";
09130 Z4$=MID$(STR$(Z4),2,LEN(STR$(Z4))-2)
09140 PRINT #1,Z4$;
09150 IF (Z<0)THEN PRINT #1,"-";:RETURN
09160 PRINT #1," ";:RETURN

```

Listing 2: A test program for the B.H. BASIC subroutine (shaded) to print numerical data in the range -32767.90 to +32767.90. Preceding zeroes will be suppressed and decimal points aligned.

dollars and cents; or 8,388,607 for whole numbers. (A discussion of these limits accompanies this article.)

With a little thought, one can easily arrange meaningful displays of numeric information using only six or seven digits. For example, it is good standard accounting practice to omit fractions of dollars from our income tax returns. So, whereas a limit of \$32,767.90 may seem restrictive in these inflationary times, many of us can do a credible job if the values are limited to \$8,388,607. Again, these values are not arbitrary. They are the limits of guaranteed accuracy for the two subroutines presented later. Note that in both cases there are seven significant digits in the numbers.

Getting better appearance

Moving now to the question of neatly aligned columns of numbers, we should first note that the Heath Disk Operating System (HDOS) and especially B.H. BASIC are very fine, under-advertised, under-applauded systems. Furthermore, the price is right. If you purchased HDOS or the older cassette operating system from Heath, you got a version of "Extended Benton Harbor BASIC" at no additional cost. The storage requirements of competing software can make a one-floppy system look very tiny, indeed. With HDOS and B.H. BASIC, one can implement some quite extensive applications.

Among the niceties which some

BASIC interpreters and compilers offer is a convenient mechanism to print columns of numbers with the decimal points aligned. This feature is usually implemented as PRINT USING. The proposed international standard for BASIC provides for PRINT USING approximately as follows:

PRINT USING "\$###.##";2
would print \$ 2.00. This is not available with B.H. BASIC.

Listing 2 is a subroutine which will print numerical data in the range -32767.90 to +32767.90, with preceding zeroes suppressed and decimal points aligned. The data are presented in the manner normally associated with dollars and cents reports. The routine could be modified to print larger values or to print more digits to the right of the decimal point. In these cases, the total number of significant digits would have to remain the same and the limit of accuracy would have to be re-established.

Listing 3 is a similar routine which prints values in the range -8,388,607 to +8,388,607 with commas inserted around the millions and thousands digits—in a manner pleasing to the eye and conventionally associated with numerical presentations.

To use either of these subroutines, simply set the variable Z equal to the value to be printed, then position the cursor or print head by issuing a "PRINT TAB(n);"—where n is the column for the

```

1.98
15.00
23678.98
25678.98
27678.98
29678.98
31678.98

```

Figure 1: The output of Listing 2.

start of the print field. Then call the appropriate routine. If the routines are used to generate files for later printing, then each PRINT command will have to be modified to an appropriate PRINT#chan command.

I hope the following explanations of Listing 2 and Listing 3 will enable you to understand the routines fully and also gain some insights into Benton Harbor BASIC.

Listing 2: Up to 32767.90

Line 9010 tests for the limit of guaranteed accuracy of the subroutine. It is always good programming practice to make such a test.

Line 9020 first rounds the value to be printed so that it will be accurate to the nearest hundredth. Then the integer portion of the value is assigned to the variable Z3. Z3 is the value which will be printed to the left of the decimal point.

Line 9030 removes the leading and trailing blanks from the ASCII representation of the value.

Lines 9040 through 9070 are a FOR...NEXT loop to print spaces in the beginning of the field so that when the character string representing the value of Z3 is finally printed, it will terminate in the position just to the left of the decimal point. An optional implementation to accomplish the same result would be successive tests of Z3 against 9, 99, 999, and 9999. This approach, as a matter of fact, appears to execute somewhat faster than the FOR...NEXT loop. It is the option used in Listing 3.

Line 9080 prints the character string built in line 9030.

Line 9100 prints the decimal point. For all values of Z accepted by line 9010, this will occur at the print position six spaces to the right of the cursor (or print-head) position when the subroutine was called.

Line 9110 rounds the value of Z as was done in line 9020. Then the integer portion of the number is stripped away by subtracting Z3. This leaves the fractional portion of the number to be printed. The program then isolates this fractional portion by multiplying it by 100. When the integer portion of the product is extracted, the result is a whole number which is correctly rounded to an integer corresponding to the fractional portion of Z.

Line 9120 prints a zero to the right of the decimal point for those values of the

Checklist for Z-100 Computer Users:

☒ 1. Are you getting the best prices?

If you put two computer dealers in the same room, and they BOTH tell you that "they won't be undersold", then one thing you can be sure of is that at least one of them is full of it! We won't make such a silly claim, but it is true that our prices are consistently amongst the lowest — and very often ARE the lowest around!

☒ 2. Does your dealer solve problems, or create them?

When you are just learning a computer system, one thing you DON'T need is a dealer that you have to TRAIN! On our staff we have no one with a background in computer sales, but we DO have people with backgrounds in computer science and engineering! In place of hard-sell, you'll get solutions. If it doesn't sound like much, ask yourself if you'd trust your accountant to recommend a good compatible printer to you!

☒ 3. Do you receive merchandise on time?

Wizardry normally can (and WILL) ship stock items within 24 hours, and most items ARE in stock. In most cases we ship standard UPS, but we also can ship UPS Blue or even Federal Express when you're really in a pinch, for delivery within a mere 2 days to your door!

☒ 4. Is your supplier a proven performer?

We're proud of our past record, and our reputation. Many of the same people now developing products for the Z-100 got their start in a computer from us. These guys know where the best single-source for pricing, support, and service is — and they keep coming back for the same reason. Our support is legendary, and we've literally won awards for end-user support to our customers.

☒ 5. What are your dealer's references?

If we listed just the major firms and institutions that purchase their products from us, we'd fill this page with just their names. Scratch a knowledgeable computer consumer, and you're apt to find a Software Wizardry customer there.

☒ 6. Isn't \$1,000 worth a few minutes of your time?

That's how much we can save you on an average system sale! All it takes is a letter or phone call to receive our FREE catalog. In it you'll find over 450 compatible Z-100 products, probably many you didn't even know existed! We LOVE the Z-100 computer, and think the Zenith users are the best in the world! That's why we know our future is secure, the best users sooner or later find their way to the best dealers. We wouldn't have it ANY other way!



data
systems

AUTHORIZED SALES & SERVICE

Software Wizardry
THE MAGIC TOUCH



122 Yankee Drive
St. Charles, MO 63301
(314) 946-1968

Circle #166 on Reader Service Card


```

00110 OPEN "SY1:TEST02.DAT" FOR WRITE AS FILE #1
00120 PRINT #1,TAB(20);"SAMPLE RUN # 2"
00130 PRINT #1,
00140 PRINT #1,
00150 Z=2
00160 GOSUB 10000
00170 PRINT #1,
00180 Z=1000
00190 GOSUB 10000
00200 PRINT #1,
00210 FOR Z=33 TO 8000000 STEP 1000000
00220 GOSUB 10000
00230 PRINT #1,
00240 NEXT Z
00250 CLOSE #1
00260 STOP

10000 REM SUBROUTINE TO PRINT #1,Z AS A COLUMNAR-ALIGNED INTEGER.
10010 IF (ABS(Z)>8388607) THEN PRINT #1,"OVERFLOW!!";:RETURN
10020 IF (Z=0) THEN PRINT #1,"      0";:RETURN
10030 IF (Z<0) THEN PRINT #1,"-";:GOTO 10050
10040 PRINT #1," ";
10050 Z1=ABS(Z)
10060 Z3=INT(Z1/1000):Z3=INT(Z3/1000)
10070 IF (Z3=0) THEN Z$=" ":PRINT #1," ";:GOTO 10100
10075 Z$="0"
10080 Z3$=MID$(STR$(Z3),2,1)
10090 PRINT #1,Z3$," ";
10100 Z2=INT((Z1/1000)-Z3*1000)
10110 GOSUB 10500
10120 IF (Z$=" ") THEN PRINT #1," ";:GOTO 10140
10130 PRINT #1," ";
10140 Z4=INT(Z1-(Z3*1000000)-(Z2*1000))
10150 Z2=Z4:GOSUB 10500
10160 RETURN
10500 IF (Z2=0) THEN PRINT #1,Z$;Z$;Z$;:RETURN
10510 Z2$=MID$(STR$(Z2),2,LEN(STR$(Z2))-2)
10520 IF (Z2>99) THEN PRINT #1,Z2$;:GOTO 10550
10530 IF (Z2>9) THEN PRINT #1,Z$;Z2$;:GOTO 10550
10540 PRINT #1,Z$;Z$;Z2$;
10550 Z$="0"
10560 RETURN

```

Listing 3: A test program for the B.H. BASIC subroutine (shaded) to print values in the range -8,388,607 to +8,388,607. Commas will be inserted around the millions and thousands digits.



They laughed when I told them what ZI costs. They stopped laughing when I sat down at the keyboard and showed them what ZI can do. Simple, reliable and easy to use terminal emulation and file transfer under Z-DOS for the (laughable) price of \$25.00 (plus \$2.00 S & H).

Dale Wilson
Codewright
231 Couch Ave.
St. Louis, MO 63122

fractional part in the range 00 through 09.

Line 9130 uses the same technique applied in line 9030 to strip away the leading and trailing spaces from the character representation of the number.

Line 9140 prints the fractional part of Z.

Line 9150 prints a minus sign to the right of the field for negative numbers. This minus sign could be printed preceding the field by placing this test before line 9050. The decision in this matter is purely personal. I selected the trailing minus because it corresponds to the conventions of an adding machine I use.

Line 9160 prints a space if the number Z was positive. This assures that on return to the caller the print head will always be nine spaces to the right of its position when the subroutine was entered. This is true for all values of Z: positive, negative, 0, or illegal values.

Listing 3: Up to 8,388,607

In some ways, this routine is less

```

      2
    1,000
      33
    1,000,033
    2,000,033
    3,000,033
    4,000,033
    5,000,033
    6,000,033
    7,000,033

```

Figure 2: The output of Listing 3.

complex than Listing 2. It serves to illustrate that similar objectives can be achieved with alternate coding choices.

Line 10010 tests for the limit of accuracy and returns the string of appropriate length for values which exceeded the limit.

Line 10020 tests for 0 which is a special case. If this test were not made, the routine would print a blank line for zero.

Lines 10030 and 10040 put a minus sign (-) or a blank in the first position of the print field depending on the sign of the number.

Line 10050 sets up an assured positive number for all subsequent operations. An optional implementation here would be to round the value of Z ($Z1 = \text{ABS}(Z) + 0.5$). This, however, would change the limit of accuracy of the subroutine. As presented, the subroutine works correctly with integer numbers and truncates the fractional part of real numbers.

Line 10060 is a "trick" to force B.H. BASIC to generate a number which is the millions digit for values such as 1,999,999. Unless this two-step process is followed, B.H. BASIC will "round" the result of the division up, giving us "2" rather than "1" as the result. On completion of this line, Z3 is an integer value in the range 0, ..., 8.

Line 10070 tests for Z3=0. If this is so, then the number to be printed is less than 1,000,000 and we must print an appropriate number of spaces. The string variable Z\$ is used to provide for either printing leading zeroes in subsequent fields (Z\$="0") or for printing spaces in the position of leading zeroes in subsequent fields. If the value of Z3 is zero, then the number to be printed is less than 1,000,000. Therefore, there is at least one leading zero (and possibly more) to be suppressed. Z\$ is set to the character space. Two spaces are printed. The branch to line 10100 then skips the next three lines.

Line 10075 is entered only if the number is 1,000,000 or larger. The string variable Z\$ is set to the character "0" (zero). This variable is used to keep us from suppressing significant digits in the subsequent areas of the field.

Line 10080 is similar to line 9030 in Listing 2. In this case, we are assured that the range of the number is 0 to 8. Therefore, we extract only a single char-

FREE CP/M-Plus™

from **MAGNOLIA**
MICROSYSTEMS

New Reduced Prices

Prices effective 1/1/84

With purchase of 128K RAM Board at ~~\$595~~

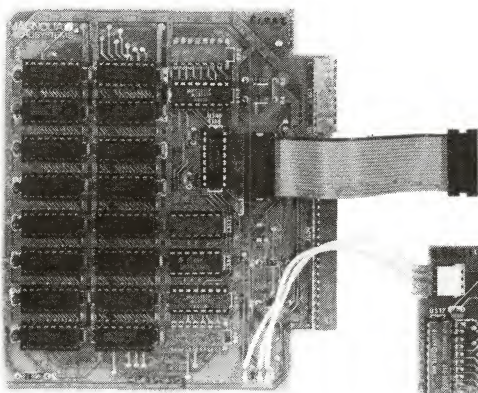
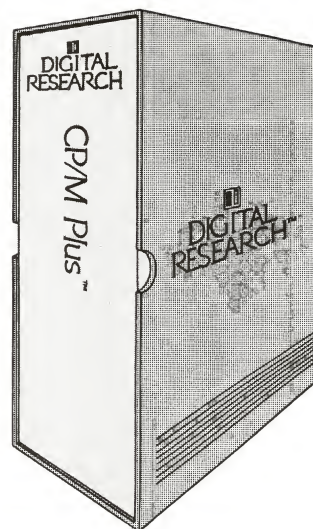
Now \$495

Digital Research's list price for CP/M-Plus is \$350, but it will be included AT NO EXTRA CHARGE with purchase of our 77318 128K RAM board

CP/M-Plus™ support is available for Z89 and Z90 computers with our 128K RAM board and either the Z89-37 (Z90) or our own 77316 Double Density disk controller. Over 700K of files are included, so it will not be distributed on Hard Sector media.

Using banked RAM, disk performance is enhanced through Hashed Directory tables, Directory Buffers, and LRU Data Buffers.

New utilities and features include a 'Help' command; optional Password protection and Time and Date Stamping of files; Console Redirection to or from disk files; and many others.



Our implementation of CP/M-Plus REQUIRES the use of our 128K RAM board. We have no plans to implement an un-banked memory version, most of the advantages of CP/M-Plus are neither available (nor practical) in an un-banked version.

Our BIOS supports both our 77316 and Zenith's Z89-37 Double Density controllers, Heath's H88-1 (Z17) Single Density controller, and our 77314 CORVUS and 77320 SASI-bus interfaces.

We are including the SOURCE code for our BIOS, together with Digital Research's MAC, RMAC, LINK, and SID software development tools, you may customize it to your specific application.

Orders must specify the Double Density controller and boot drive: the Z89-37 (as used in the Z90) or our 77316 (5-inch or 8-inch).

Earlier purchasers of the 128K RAM board, who are registered owners of Magnolia Microsystems CP/M 2 (S/N 2-175-xxxx) can update to CP/M-Plus for \$100 (plus shipping and handling).

DISK INPUT/OUTPUT (I/O) BOARDS

These boards are made available apart from our subsystems for use by 'Systems Integrators'. End-users should carefully consider their skills and desired level of involvement before undertaking this responsibility; purchasing a complete subsystem from a qualified integrator may be a wise choice.

Although similar in name and apparent function, these boards fall into two distinct classes:

- **INTERFACE** boards connect a disk subsystem (containing a controller) to the computer. These boards include the Z89-47 and Z89-67 and our 77314, 77317, and 77320 interfaces.
- **CONTROLLER** boards actually control a plain disk drive. These boards include the H88-1 (Z17) and Z89-37, and our 77316 Double Density Controller.

All Magnolia I/O boards use proprietary techniques to expand the 89's I/O addresses, allowing use of more than Zenith's 5 (3 serial ports, 2 disk controllers). Since our INTERFACE boards also contain 3 RS232 ports (replacing the machine's H88-3) allowing expansion of the I/O capability without using an additional card slot.

Each Magnolia I/O board package includes:

- The disk I/O board itself
- A new I/O decoder PROM
- A new Monitor EPROM
- A copy of MMS CP/M 2.2

Magnolia's CP/M software supports over 20 soft-sectored media formats, including all existing Zenith formats.

MAGNOLIA MICROSYSTEMS, INC. • 2264 - 15th Ave West
(206) 285-7266 (800) 426-2841 • Seattle, Washington 98119

Double Density Disk Controller order number 77316

This board adds complete hardware and software support for four 8" single- or double-sided AND four 5" SS or DS, 48- or 96-track-per-inch (40- or 80- track) drives, at both single and double recording densities.

This controller is compatible with 8" drives by Shugart, Qume, and Tandon; 5" drives by Siemens, Tandon, and MPI; and most other 'industry standard' drives (possibly depending on the skill level of the experienced 'Systems Integrator').

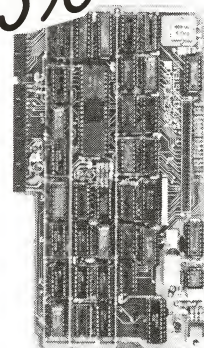
SASI-bus Winchester Interface order number 77320

This board (functionally replacing the Z89-67 interface) contains 3 RS232 ports and can support up to 8 SASI-bus disk controllers, with up to 4 drives on each!

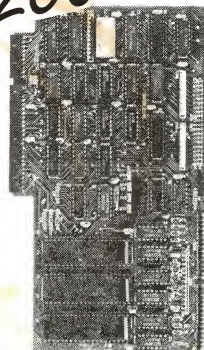
It is compatible with Winchester controllers by Xebec, DTC, Shugart, and others, as well as Zenith's Z67. CP/M software support for popular controller/drive combinations is included.

CP/M is a registered trademark, and CP/M-Plus, MAC, RMAC, and SID are trademarks of Digital Research

~~\$495~~
\$395



~~\$350~~
\$250



acter, without bothering to calculate the length of the string.

Line 10090 prints the single character string which contains the millions digit, and then it prints a comma.

Line 10100 sets Z2 equal to the hundred thousands, ten thousands, and thousands digits. Note that Z2 may be any value in the range 0 to 999. For numbers such as 6,000,123, Z2 will be 0. Since similar logic is required for printing these digits and the last three of the number, a nested subroutine (lines 10500-10560) is called.

Line 10120 is entered with the cursor positioned immediately after the thousands digit. If we are suppressing insignificant zeroes, the variable Z\$ will contain a single space. If we have entered the range of the number, Z\$ will contain the character "0". We accordingly print a space or a comma (at line 10130).

Line 10140: Since Z3 is the value of the millions digit and Z2 is the value of the hundred thousand, ten thousand, and thousands digits, this calculation will set Z4 to a value which is that portion of the number less than 1,000.

Line 10150 moves the value just determined to Z2, since the subroutine at 10500 works with Z2. Upon return from the nested subroutine at 10500, all the appropriate characters have been printed and the print head is guaranteed to be 10 positions to the right of its position at entry.

Line 10160 is the normal return to the routine which called line 10000.

Lines 10500-10560 are a nested subroutine used by the program to print groups of three digits with the possibility of suppressing leading zeroes.

Line 10500 checks to see if the value on entry is zero. If so, we must either print three spaces (if we are suppressing leading zeroes) or three zeroes. Since the value of Z\$ is either a space or a zero character (as set by line 10070 or by line 10075), we can simply print Z\$ three times and return.

Line 10510 is similar in appearance and function to line 9030 in Listing 2. In this instance, Z2\$ will be a string that is 1, 2, or 3 characters long and represents the value of Z2.

Line 10520 tests if Z2 is 100 or larger. In this case, Z2\$ is assured to be three characters with no leading zeroes. The string is printed.

Line 10530 is entered only if the number Z2 is 99 or smaller. We test to see if the value is larger than 9. If it is, then we are working with a number in the range 10, 11, ..., 99. We print the character in Z\$ (a space or zero depending on whether zeroes are being suppressed or not) and then we print the two characters in Z2\$.

Line 10540 is entered only if the value of Z2 is 1, 2, ..., 9. We print the space or zero in Z\$ twice and then print the single character which is in Z2\$.

Line 10550 is entered only when a non-zero has been passed to this subroutine. Now this may occur on printing of the digits for values above 1,000 or for values below 1,000 or both. Consider these possibilities in turn.

On printing of digits of values above 1,000: In this case, the next call to this nested subroutine will be to print digits

for values less than 1,000. Since the number is larger than 1,000, we desire to not suppress leading zeroes on the next call.

On printing of digits of values below 1,000: In this case, the subroutine will not be called again until the larger subroutine is again invoked. The correct value of Z\$ will be set by line 1070 or

On determining the accuracy of results

The following is provided for those readers desiring more insight into the limits of accuracy of the two subroutines.

B.H. BASIC stores all numbers internally as "floating point." Four bytes are allotted to each number: three bytes for the "mantissa" and one byte for the two's exponent. The "mantissa" is really just the binary representation of the number with an assumed "binary point" (as opposed to the decimal point) at a location indicated by the exponent.

The examples in Table 1 should illustrate.

The exponents are all scaled by 200 octal (Q). An exponent of 177Q means -1. An exponent of 200Q means 0. An exponent of 201Q means +1. When the exponent is zero, the binary point implicitly belongs between the first and second bits of the mantissa. If more than zero, it moves the corresponding positions to the right; if less, to the left. (Remember: octal. So an exponent of 227Q will be +23.)

Consideration of the algorithm in Listing 3 is somewhat simpler than Listing 2, so we will address the accuracy of integer numbers first. In Table 2, observe the progressive use of more and more binary digits to represent decimal numbers as each power of two is approached and exceeded.

Observe that the orderly binary counting breaks down at 8,388,607. As mentioned in the body of the

article, the algorithm fails after 8,388,607. To accurately handle higher numbers, we would need the extra bit indicated in parentheses.

This entire discussion presumes ideal, "normalized" representations of the numbers. That is, representations in which the maximum range of accuracy is available. In the course of calculations, it is possible to generate intermediate results which do not use the entire range. Therefore, the user is cautioned that it may be possible to obtain unexpected results.

Consider, by the way, that the Benton Harbor BASIC manual flatly states that the largest integer number is 65,535. This, of course, does not seem to be the case at all. I am not sure why the manual makes this statement. B.H. BASIC, however, does not seem to distinguish between integer types and floating point, etc., except when specifying arguments for functions. (PEEK, for instance, takes an integer argument.) In such a case, the limitation is entirely reasonable.

Fractions

Consider now the representation of decimal fractions in floating point notation. Representing whole numbers, of course, is no problem. But while we can easily represent some decimal fractions (.5 and .25, for instance), tenths and hundredths turn out to be irrational numbers in binary. (.1 equals .0001100110011...

Decimal Number	Binary Number	Binary Mantissa			Exponent
1.0	1.0	01000000	00000000	00000000	201Q
0.5	0.1	01000000	00000000	00000000	200Q
0.25	0.01	01000000	00000000	00000000	177Q
2.0	10.0	01000000	00000000	00000000	202Q
3.0	11.0	01100000	00000000	00000000	202Q
4.0	100.0	01000000	00000000	00000000	203Q

Table 1: Examples of how Benton Harbor BASIC stores numbers. Four bytes are allotted to each number: three bytes for the "mantissa," one for the "exponent." The mantissa is the binary representation of the number with an assumed "binary point" indicated by the exponent. An exponent of 200Q would place that point between the first and second bits of the mantissa.

1075. No harm has been caused.

In summary, although Benton Harbor BASIC does not have double-precision arithmetic and it does not support PRINT USING, this is no hindrance to preparation of neatly aligned columnar data. With due consideration to the scale of values to be represented, meaningful and attractive displays can be prepared.

References

Software Reference Manual, Cassette System, Extended Benton Harbor BASIC, Heath Part #595-2347, Heath Company, 1979.

Software Reference Manual, HDOS System, Extended Benton Harbor BASIC, Heath Part #595-2479, Heath Company, 1980.

Decimal Number:	Binary Mantissa	Exponent
32,766	01111111 11111110 00000000	217Q
32,767	01111111 11111111 00000000	217Q
32,768	01000000 00000000 00000000	220Q
32,769	01000000 00000000 10000000	220Q
4,194,304	01000000 00000000 00000000	227Q
4,194,305	01000000 00000000 00000001	227Q
8,388,606	01111111 11111111 11111110	227Q
8,388,607	01111111 11111111 11111111	227Q
8,388,608	01000000 00000000 00000000(0)	230Q
8,388,609	01000000 00000000 00000000(1)	230Q
8,388,610	01000000 00000000 00000001(0)	230Q

Table 2: Examples to illustrate the progressive use of more binary digits to represent decimal numbers as each power of two is approached and exceeded. Observe that the orderly binary counting breaks down at 8,388,607. As mentioned in the body of the article, the algorithm fails after 8,388,607. To accurately handle higher numbers, we would need an extra bit—indicated by the digits in parentheses.

ad infinitum.) So we have to make do with approximations. Table 3 shows a sample to produce the binary equivalent of .99.

It can be seen that at least eight binary digits are required to represent decimal values in the range sought by the algorithm. If eight are taken from the total of 23 bits available for the entire mantissa, then the largest integer part of the number would of necessity be limited to 15 bits. Now,

$$2^{15} - 1 = 32,767$$

On test, the program is observed to fail at values exceeding 32,767.90.

Testing of the algorithm in Listing 2 was somewhat ambiguous. Use of

Binary Number:	Decimal Value:
.1	.5
.01	.25
.001	.125
.0001	.0625
.00001	.03125
.000001	.015625
.0000001	.0078125
.00000001	.00390625
.11111111	.99609375

Table 3: A sample to produce the binary equivalent of .99.

FOR...NEXT loops with the STEP increment set to .01 yielded inaccurate results on several occasions. In each case, the value of Z was then set to the indicated failing value and the subroutine was again called. In each case, the subroutine returned the correct print field. The conclusion is that for some values, the B.H. BASIC implementation of FOR...NEXT can yield results which vary by as much as .001 decimal if the increment is .01.

Additionally, the program in Listing 2 adds .005 to each value it receives in order to round the value to the nearest one hundredth. However, .005 is only imperfectly represented with eight binary digits. Binary .00000001 or decimal .00390625 is in fact nearly 22% off the precise value.

So the user is reminded that the accuracy of the intermediate results may influence the accuracy of the values passed to the routine.

References

Software Reference Manual, Cassette System, Extended Benton Harbor BASIC, Heath Part #595-2347, Heath Company, 1979.

Software Reference Manual, HDOS System, Extended Benton Harbor BASIC, Heath Part #595-2479, Heath Company, 1980.

COMMUNICATE!



Smart Terminal Emulator
& File Transfer Program
for the



Now with XMODEM protocol!

COMMUNICATE WITH { Remote Hosts
Other Micros
SOURCE
Dow Jones ..

ZSTEM EMULATES:
VT52 VT100 D200
Hobby version also available

KEA SYSTEMS LTD.
Department ZS-4
#311-811 Beach Avenue
Vancouver, B.C.
CANADA V6Z 2B5
(604) 687-2744 9-5 PST Mon-Fri

Circle #175 on Reader Service Card

H19/H89/H89A

Improve your keyboard—add easy to use
Automatic Key Repeat Circuit
Complete kit.....\$25
Assembled & tested\$35

CDR Systems disk controller for H89.
Our price.....\$419

EMULATE.COM—You can now read/write to Osborne, Xerox, Morrow and other disk formats! Requires CDR Controller.....\$29
HEATH H37 version is coming!

Media xfer service—CP/M 8" standard to any HEATH 5 1/4" format....\$5/disk
You supply a formatted destination disk. We can also transfer to/from Osborne, Xerox, Morrow and many others!

The Software Toolworks®
We sell it at 20% discount!
Include \$1/order for handling.

Send for info on other kits and software

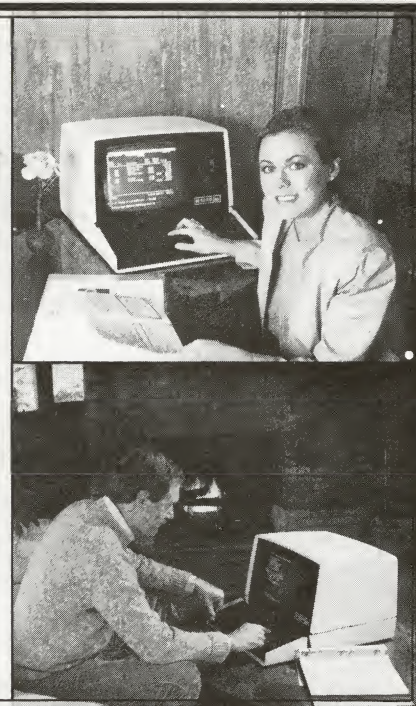
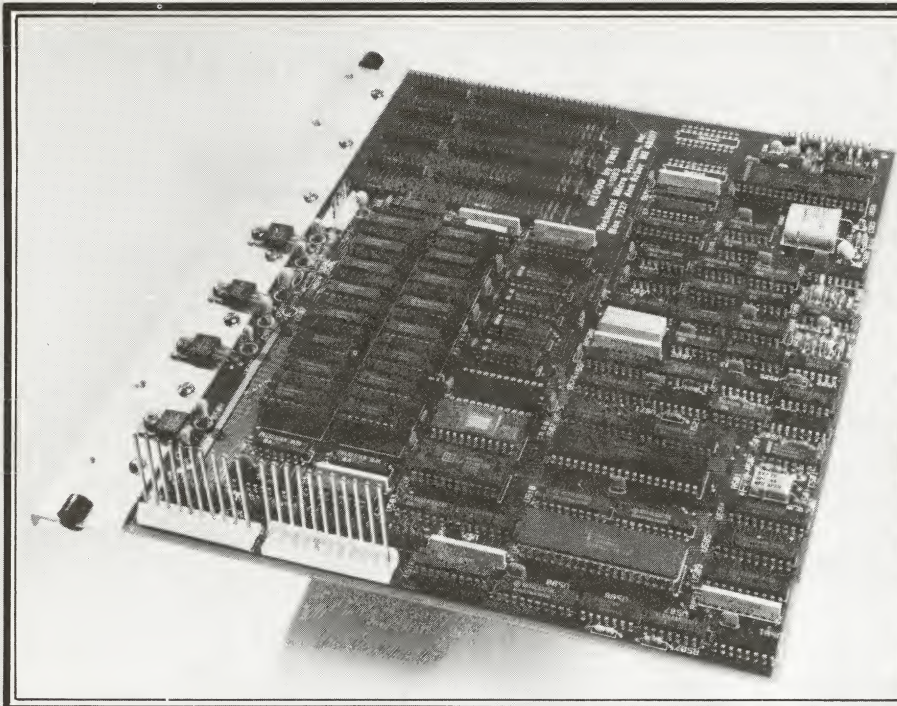
WE PAY POSTAGE!
CA residents add 6% tax
Specify disk format on software



ANALYTICAL PRODUCTS

29924 Road 168
Visalia, CA 93291
(209) 747-3235

Circle #197 on Reader Service Card



You can be a performance leader in business or at home with the H-1000.

Great News for Heath & Zenith Owners!

A Z80/8086 Upgrade for the H89/Z89

The H-1000 is a plug in replacement for your present CPU board, giving you twice the speed, twice the I/O capacity and four times the memory. Yet it's totally compatible with all your present H89/Z89 hardware and software. Best of all, we've added the 8086, a true 16-bit CPU for the high performance software of the 80's. You get compatibility with such machines as Zenith Z-100 and IBM PC at a fraction of the cost of a new system.

Regardless of the operating system, you get virtually all the benefits of an additional disk drive, even if you only have one. Our "ghost disk" system loads your disk into the memory. This becomes the extra disk drive and leaves your real drive free for another disk. RAM is many thousands of times faster than the best disk drive, so you get practically instantaneous access to information. That's important for programs requiring frequent access to large data bases, or if you simply don't like waiting while your computer talks to your disk drive.

TMSI has taken the best features of your 8-bit computer and combined them with the best of the 16's to give you a package that's state-of-the-art... and the ONLY package that lets you build on all your current investment...instead of starting over!

The H-1000 comes safely packaged, fully assembled and tested. It can be installed in under an hour using the manual provided. No soldering or special tools are required. A full 90 day warranty covers each unit with an optional service contract available.

Compare this performance leader to other systems. We think TMSI gives you your best choice.

COMPATIBILITY CHART

COMPATIBILITY CHART	8/16 BIT	16 BIT	8 BIT	8/16 BIT	
	SYSTEM	SYSTEM	SYSTEMS	SYSTEM	
	Z100	IBM PC	H89/Z89	DG SUPER 89	H-1000
Runs Z80 and 8080 code	no	no	yes	yes	yes
HDOS 2.0 compatible	no	no	yes	yes	yes
CP/M compatible	yes	no	yes	yes	yes
Runs all H89/Z89 software	no	no	yes	yes	yes
Supports all H89/Z89 hardware	no	no	yes	yes	yes
8-bit clock	5MHz	none	2MHz	4MHz	2/4MHz
16-bit clock	5MHz	4.7MHz	none	none	8MHz
Maximum memory	756k	756k	64k	256k	1048k
Runs MS—DOS and CP/M-86	yes	yes	no	no	yes
color graphics	yes	yes	no	no	no
price/performance	ouch	ouch	good	better	best

Complete systems as well as the H-1000 board are available. For more information and dealer listings, call or write NOW. Dealer inquiries invited.



TMSI
Technical Micro Systems, Inc.
P.O. Box 7227, Dept. A
366 Cloverdale
Ann Arbor, MI 48107
(313) 994-0784

copyright 1983 by TMSI

H-1000 and TMSI are trademarks of Technical Micro Systems, Inc. H89, Z89, Z100 Heath and HDOS are trademarks of Heath/Zenith Corp., Benton Harbor, Michigan. MSDOS is a trademark of Microsoft, Bellevue, Washington. CP/M and CP/M-86 are trademarks of Digital Research, Inc., Pacific Grove, California. Super 89 is a trademark of D.G. Electronic Developments Co., of Denison, Texas. IBM PC is a trademark of International Business Machines Corp., of Armonk, New York.

Create Forms on Your MX-80

You can use a dot-matrix printer to make high-quality forms.

Leonard E. Geisler

Let's face it: notes or data written on an official-looking form have more attention-getting power than notes hastily scribbled on the backs of envelopes or laundry lists! Come to think of it, that old laundry list is a *form* which allows a clerk to gather all the necessary data from customers so that their laundry is done expeditiously and to their satisfaction.

And the same applies to a shopping list, to your weight-loss program, the children's daily chores-and-rewards lists, community billboard information request posting forms, custom-designed "certificates," short-wave listener's (SWL) logs, gas mileage, tolls and up-keep forms for all your car pool members, and so-endlessly-on!

So I am presenting here a practical "Form Formula" which should help you create and print your own private, limited-edition, standardized forms. This is a "how-to" for those readers who may occasionally have to create business or other forms with their H8/89 computer and Epson MX-80 printers. In this article, I'll try to show you the complete steps to design and print the heading and body of a form.

The Heath Users' Group (HUG) has published numerous and helpful articles and notes in its journal, *REMark*, from which I've garnered considerable knowledge and material for this article. I've also flipped the pages of my Epson manual until they're worn out, preparing these form examples.

Caveat

Before you try any of the ideas I've put together here, you must have Heath's LPMX80.DVD printer input/output (I/O) program. It comes with the Heath Disk Operating System (HDOS) version 2.0 and you should install it on your Benton Harbor BASIC working disk. Rename this driver as LP.DVD. Make sure the internal switches of your MX-80 are set as I've indicated in Table 1; and that the appropriate computer serial I/O port is connected properly to Heath's interface card in the MX-80. The interface switches are set for 4800 baud, LPMX80.DVD's "default" value.

Boot your working BASIC disk, then type: SET LP: HELP (don't forget the carriage return <CR>) and study the SET option menu. Now type these settings into LP.DVD:

NODOUBLE allows program density control

NOEMPH allows program density control
WIDTH 132 allows 10 or 17 characters/inch print
FORM feeds next sheet of paper
PAGE 60 number of typed lines on sheet

Don't fool with any of the other LP.DVD (LPMX80.DVD) SET options, except to turn them off if you've set them other than as PIPped from the distribution disk. This will keep you from experiencing a lot of strange results as your program fights LP.DVD.

The examples presented here employ MX-80 graphics and other important printer commands to expand, emphasize, and otherwise make the finished work reasonably attractive, yet quite useful. Use these ideas as a basis for your own designs.

Step 1—Design a heading

This will use a lot of printer paper, as it is very difficult to space MX-80 graphic characters and double-wide, double-dark letters to fit nicely on your paper. (That neat example of the MX-80's capabilities on page 65 of Epson's manual probably took several eight-hour days to program.) I recommend you dig out all that scrapped printout you've squirreled away and use its blank side until you're satisfied your program is what you want.

a. Print an alignment rule on the top and bottom of several sheets of blank paper. Use the program in Listing 1 by itself and rewind the paper for overprinting, or combine Listing 1 with your preliminary header as in my example.

b. Write a short "printer" program which tabs all the lines in your heading

the same distance from the left margin and run it on one sheet of paper. For starters tab just three spaces.

c. Check the printout for spelling and punctuation and correct errors before continuing. Re-do your "printer" as needed and run another—correct—copy.

d. Lay the printout on a flat surface and use a ruler to draw connecting (colored) pencil lines between similar points on the top and bottom printed ruler scales.

e. Count the spaces between the last character of each line and the right-hand margin to determine which way you have to shift each line to make it symmetrically centered on the sheet. If you've used double-width characters, this may take several tries before it comes out. (Courage & Fortitude!!)

f. When satisfied your heading is just right, delete the ruler-printer lines and run a "proof copy" to verify its appearance. Use up all that scrap computer printout—paper's expensive.

Step 2—Design the body

Study the complete program listing to see how I constructed it. You might try putting in a GOSUB as I did in Listing 1 to print a scale at the top and bottom of your trial printouts. Note the GOSUB at line 270; it eliminates a lot of program typing and your MX-80 will buzz right along. Notice that there are 16 loops to print eight lines of dashes and eight double-spaces. Adjust the subprogram to fit your requirements. Also note that it is easier to type in the correct number of dashes when combined with words than to try to use another GOSUB. Also, note the way I set up my program so it asks

MX-80 Internal Switches				8141 Serial Interface	
Switch	Setting	Switch	Setting	Switch	Setting
1-8	ON	2-4	OFF	1-1	ON
1-7	OFF	2-3	OFF	1-2	OFF
1-6	ON	2-2	ON	1-3	ON
1-5	ON	2-1	ON	1-4	OFF
1-4	OFF			1-5	ON
1-3	OFF			1-6	OFF
1-2	ON			1-7	OFF
1-1	ON			1-8	n/a

Table 1: These are the appropriate settings for the MX-80 for use with the form-printing procedures described in the article.

you for and prints just the number of copies you want. Of course, I could have used Benton Harbor BASIC's CIN(0) function, but then you wouldn't have any fun, programming that in!

I'm not going to go into details here, since your form will be different from my example. Use it as a guide while composing your own.

Step 3—Fancy stuff

I have never seen a form that did not have "fine print" on it somewhere! Back in the paragraph on setting your LP.DVD,

I told you to set WIDTH 132. Here's where you'll need it. And you'll need a double set of form spacing rulers to help in composing those lines of fine print so they look professional. See Listing 2 for a program which prints both alignment rulers. In this listing, I've included text from my example to give you an idea of how to proceed. Be sure to include blank spaces in text lines where they end with a double quote and semicolon (";"). If you don't, you'll have words all run together. (See my example.) Of course, this can be used to split words

you want to print as a whole, if they don't fit into one program line.

Note that I held all text lines here to about 56 spaces between BASIC quotes. This helps prevent "wraparound" and makes it much easier to read your program hardcopy. (You *do* make one for backup, don't you!?) It also makes it easier to compose text to fit into those 132 spaces ($56 + 56 + 20 = 132$).

And then there's *mixed-size* printing. See how I've combined Epson's CHR\$(15) (narrow letters) with CHR\$(14) (wide letters) modes? I think this is an elegant

```
00005 REM FORMRULE VER 1.1 30 JAN 83
00010 REM by L.E. Geisler, Ann Arbor, Michigan 48105
00015 REM May be reproduced only if author is given credit.
00020 REM SET LP: NOFORM and use printer LF to advance paper & view printout
00025 REM Delete all REM lines from finished program to conserve memory
00030 POKE 12121,255
00035 REM Allows access to MX-80 graphics by BASIC
00040 OPEN "LP:"FOR WRITE AS FILE #1
00045 REM Fetch form rule printer sub program
00050 GOSUB 5000
00055 REM One rule printed, continue program
00060 PRINT #1,CHR$(27)"E"CHR$(27)"G"
00065 REM Tells printer to print double-strike, emphasized characters
00070 PRINT #1,CHR$(14)"PRECISION COMPUTER EQUIPMENT SERVICE CO."
00075 REM tells printer to print double-width characters, print 1st line
00080 PRINT #1,
00085 REM feeds one blank line
00090 PRINT #1,TAB(5)"A Healthy Computer Pays For Itself!"
00095 REM prints slogan in double-strike, emphasised mode
00100 PRINT #1,CHR$(27)"F"CHR$(27)"H"
00105 REM Tells printer to go back to ordinary single-strike letters
00110 GOSUB 5000
00115 REM Print another alignment rule
00120 CLOSE #1:END
00125 REM All done.
00130 GOSUB 500
00140 CLOSE #1:END
00145 REM BE SURE TO RE-SET LP: FORM before printing out finished work!
05000 REM Here's a ruler for you to use for judging copy alignment
05010 FOR I=1 TO 8:PRINT #1,"|.... .";:NEXT I:PRINT #1,:RETURN
```

Listing 1: FORMRULE.BAS; this program may be used to print an alignment rule. This incorporates the heading of the example form shown in Figure 1.

```
.....^.....^.....^.....^.....^.....^.....^.....^.....^.....
PRECISION COMPUTER EQUIPMENT SERVICE CO.
A Healthy Computer Pays For Itself!
.....^.....^.....^.....^.....^.....^.....^.....^.....^.....

LINE 90 TAB CHANGED FROM 5 TO 24 FOR 2ND RUN; ITS CENTERED!

.....^.....^.....^.....^.....^.....^.....^.....^.....^.....
PRECISION COMPUTER EQUIPMENT SERVICE CO.
A Healthy Computer Pays For Itself!
.....^.....^.....^.....^.....^.....^.....^.....^.....^.....
```

Figure 1: The output of Listing 1, with an alignment rule. (Reduced 25% in size.)



7th Anniversary Sale!

Right now, you can
start a subscription to
***Buss: The Independent Newsletter
of Heath Co. Computers***

**at the Special Introductory Price of \$7 for 7 issues!
—A Savings of 45% Off the Usual Introductory Price—**

Since April 1977, *Buss* newsletter has been dedicated to bringing system-specific news to users of Heath® and Zenith computer systems. During the past seven years, *Buss* has often been the first to bring its readers news of events in the Heath/Zenith community and future product plans. As *Buss* celebrates the completion of its 7th year of publication, we'd like to invite you to join the information exchange which is *Buss*—for only \$7.

In each and every issue, you'll find out who the independent suppliers supporting Heath/Zenith are, what they're doing, what other users are doing, and where to get the products and information you need—all in one newsletter which comes to you twenty times a year, by first class mail.

As a subscriber to *Buss*, you can learn what other users and independent suppliers have to say about:

- | | | | |
|--|--|--|------------------------------------|
| <input type="checkbox"/> H8 | <input type="checkbox"/> printers | <input type="checkbox"/> business applications | <input type="checkbox"/> utilities |
| <input type="checkbox"/> H/Z89 | <input type="checkbox"/> terminals | <input type="checkbox"/> home/hobby applications | <input type="checkbox"/> Z-DOS |
| <input type="checkbox"/> Z100 | <input type="checkbox"/> disks and drives | <input type="checkbox"/> games | <input type="checkbox"/> HDOS |
| <input type="checkbox"/> compatible hardware | <input type="checkbox"/> compatible software | <input type="checkbox"/> graphics | <input type="checkbox"/> CP/M |

Twenty times a year, you'll get the newsletter which helps you:

- Learn what new products are being developed and where to get them, in *Buss's* new product announcements.
- Benefit from the advice of users when you write in to *Buss's* Assistance Wanted column.
- Save money as you improve your system! *Buss* has a free "For Sale" listing for Heath/Zenith users.
- Avoid bugs in your system as you read how other users have solved problems they've found.
- Find out the news in the Heath/Zenith community which affects you and your system.
- Discover other users in your area through the Local Club Notes section of *Buss*.
- Get unbiased coverage on your system from the oldest independent newsletter for Heath/Zenith users. *Buss* has grown with the Heath/Zenith community, and has always been committed to supplying information particularly for the Heath/Zenith user.

Hurry to get your introductory subscription to *Buss* at a savings of 45%. This offer is good only during March and April of 1984.

Order your subscription today, and get in touch with the rest of the Heath/Zenith community!

Call Toll Free: Datatel™ 800/341-1522 (M-F 8 a.m.-9 p.m. Eastern Time) and place your order today!

Or clip this coupon and mail your order to:

Buss Dept. S9, 716 E Street S.E., Washington, DC 20003 • 202/544-0900

Yes! Sign me up for *Buss* at the low introductory price of \$7 for 7 issues!

- ☐ I've enclosed my payment of \$7. (Checks must be in U.S. dollars payable on a U.S. bank.)
- ☐ Bill me.
- ☐ Charge my: ☐ Visa ☐ MasterCard

Name _____

Address _____

Card # _____

Expiration date _____ (MC Code # _____)

This offer is valid only in the U.S., Canada, and Mexico. To start your overseas subscription to *Buss*, send \$24 (U.S.) for 10 issues. (Price includes air mail postage.)

Your satisfaction with Buss is completely guaranteed. If at any time you are not satisfied, your money will be refunded—in full.

Buss, Dept. S9, 716 E Street S.E., Washington, DC 20003


```

00010 REM    FINEPRNT  VER 1.5  29 JAN 83
00020 REM    By L.E.Geisler, Ann Arbor, Michigan 48105
00025 REM    May be reproduced only if author is given credit.
00030 OPEN "LP:"FOR WRITE AS FILE #1
00035 GOSUB 2000
00040 PRINT #1,CHR$(15)
00045 GOSUB 3000
00047 PRINT #1,
00050 PRINT #1,CHR$(14)"CUSTOMER PLEASE NOTE: "CHR$(20)"This report is used ";
00060 PRINT #1,"for billing purposes.  If service call exceeds contracted ";
00065 PRINT #1," time, it"
00070 PRINT #1,"becomes a one-time-only addendum to your original contract ";
00075 PRINT #1,"with us for the period covered by dates and times entered a";
00080 PRINT #1,"bove by our";
00085 PRINT #1,"Service Technician.  Your invoice will then show original ";
00090 PRINT #1,"contracted charges, plus subsequent accrued charges."
00100 PRINT #1,
00110 PRINT #1,CHR$(14)"SERVICE TECHNICIAN: "CHR$(20)"Fill out form complete";
00120 PRINT #1,"ly, date and sign it.  Have customer's representative read ";
00125 PRINT #1,"and"
00130 PRINT #1,"sign it.  Give original to customer.  Return carbon copy an";
00135 PRINT #1,"d your expense report to our billing department.  List all ";
00140 PRINT #1,"time"
00145 PRINT #1,"worked, including starting and finishing times.  ";
00180 PRINT #1,CHR$(14)"BE ACCURATE."CHR$(20)
00185 GOSUB 3000
00190 PRINT #1,
00205 PRINT #1,CHR$(18):GOSUB 2000
00210 CLOSE #1:END
01999 REM    HERE'S A 10-CPI FORM RULER
02000 FOR I=1 TO 8:PRINT #1,"|....  ....":NEXT I:PRINT #1,:RETURN
02999 REM    HERE'S A COMPRESSED-MODE FORM RULER; NOTE DIFFERENT SPACING
03000 FOR I=1 TO 14:PRINT #1,"|....  ....":NEXT I:PRINT #1,:RETURN
03010 REM    DON'T WORRY ABOUT LAST PRINTED UNIT WRAPPING TO NEXT LINE.

```

Listing 2: FINEPRNT.BAS; this program prints a double set of form spacing rules to help in composing lines of fine print.

```

|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....
|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....
^....

CUSTOMER PLEASE NOTE:  This report is used for billing purposes.  If service call exceeds contracted  time, it
becomes a one-time-only addendum to your original contract with us for the period covered by dates and times entered above by ourSer
vice Technician.  Your invoice will then show original contracted charges, plus subsequent accrued charges.

SERVICE TECHNICIAN:  Fill out form completely, date and sign it.  Have customer's representative read and
sign it.  Give original to customer.  Return carbon copy and your expense report to our billing department.  List all time
worked, including starting and finishing times.  BE ACCURATE.
|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....
^....

|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....

```

Figure 2a: The initial output of Listing 2, with a double set of form spacing rules. Note the inappropriate line endings, which must be repaired. (Reduced 35% in size.)

```

|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....
|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....
^....

CUSTOMER PLEASE NOTE:  This report is used for billing purposes.  If service call exceeds contracted  time, it
becomes a one-time-only addendum to your original contract with us for the period covered by dates and times entered above  by our
Service Technician.  Your invoice will then show original contracted charges, plus subsequent accrued charges.

SERVICE TECHNICIAN:  Fill out form completely, date and sign it.  Have customer's representative read and sign
it.  Give original to customer.  Return carbon copy and your expense report to our billing department.  List all time worked,
include all starting and finishing times.  BE ACCURATE.
|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....
^....

|....^....|....^....|....^....|....^....|....^....|....^....|....^....|....^....

```

Figure 2b: The output of Listing 2 (with line endings repaired), ready to be incorporated into the main listing. (Reduced 35% in size.)

touch which emphasizes the fine-print paragraphs enough so they'll be read. I admit it does call for a little extra alignment work, but it's worth it. You might even use it to tack footnote references on the bottoms of those scholarly reports, even though it means you have to run the word processor first and BASIC

second to print them! (I have to—my text processor doesn't speak Epson!)

Conclusion (at last!)

I've tried to present enough practical, step-by-step instructions and hints to allow the computer novice to turn out reasonably acceptable business-type

forms (for fun or profit, or both). With these instructions and accompanying examples, you should have little or no trouble in doing a very professional-looking job. And maybe your wife—if she's like mine—may become able to see your computer as something more than an expensive toy.

Listing 3: REFORM.BAS; the program to print the entire example form.

```

00005 REM   REFORM -- REPORT FORM PRINTER PROGRAM  VER 1.2  30 JAN 83
00010 REM   by L.E. Geisler, Ann Arbor, Michigan 48105
00015 REM   May be reproduced only by permission of author.
00017 CLEAR
00030 POKE 12121,255
00035 REM   Allows BASIC to access MX-80 graphics escape codes
00040 INPUT "HOW MANY SERVICE REPORTS? ";N
00050 FOR I=1 TO N
00055 REM   Here's a counter routine
00065 REM   It stops output when specified number of forms have been printed
00070 GOSUB 85
00075 NEXT I:REM   Note use of repetitive GOSUBS.
00080 END
00085 OPEN "LP:"FOR WRITE AS FILE #1
00090 REM   Let's get fancy & box our heading!
00095 PRINT #1,CHR$(27)"E"CHR$(167);
00100 FOR N=1 TO 78:PRINT #1,CHR$(163);:NEXT N:PRINT #1,;CHR$(203)
00105 REM   Top bar & corners done, now do the rest
00110 PRINT #1,CHR$(14)"PRECISION COMPUTER EQUIPMENT SERVICE CO."CHR$(20)
00117 PRINT #1,CHR$(181);
00118 PRINT #1,TAB(23)"A Healthy Computer Pays For Itself!";
00120 PRINT #1,SPC(22)CHR$(202)
00130 PRINT #1,CHR$(173);
00135 FOR N=1 TO 78:PRINT #1,CHR$(172);:NEXT N:PRINT #1,;CHR$(174)
00140 PRINT #1,CHR$(27)"F":REM   That's done, now let's print a service form!
00145 PRINT #1,:REM   Call up emphasized printing for easy reading
00150 PRINT #1,CHR$(27)"G"TAB(26)">> S E R V I C E R E P O R T <<"
00155 PRINT #1,:REM   Pay close attention wherever semicolons (;) are used!
00160 PRINT #1,"Customer_____";
00165 PRINT #1,SPC(4)"Complaint_____";
00167 PRINT #1,
00170 PRINT #1,"Address_____";
00175 PRINT #1,SPC(4)"_____";
00180 PRINT #1,:REM   38 characters/block + 4 spaces = 80 columns, total
00185 PRINT #1,"_____";
00190 PRINT #1,SPC(4)"P/O Number_____";
00195 PRINT #1,
00200 PRINT #1,"Phone_____Xtn_____";
00205 PRINT #1,SPC(4)"Remarks_____";
00210 PRINT #1,
00215 PRINT #1,"Contact_____";
00220 PRINT #1,SPC(4)"_____";
00225 PRINT #1,
00230 PRINT #1,"Service Tech. Check in/out time/date_____";
00235 PRINT #1,"_____";
00240 PRINT #1,
00245 PRINT #1,"Work done_____";
00250 PRINT #1,"_____";
00255 PRINT #1,
00260 FOR J=1 TO 16
00265 FOR J=1 TO 16
00270 LET J=J+1:GOSUB 2000
00275 NEXT J
00280 PRINT #1,
00281 PRINT #1,"Svc Tech sign_____";
00282 PRINT #1,SPC(4)"Customer_____";

```




```

00283 PRINT #1,
00285 PRINT #1,CHR$(27)"H":REM   Turns off emphasized printing mode.
00290 PRINT #1,CHR$(15):REM   Here's where we do the FINE print!
00300 PRINT #1,CHR$(14)"CUSTOMER PLEASE NOTE:  "CHR$(20)"This report is us";
00310 PRINT #1,"ed for billing purposes.  If service call exceeds contracted"
00320 PRINT #1,"time, form becomes a one-time-only addendum to your original";
00330 PRINT #1," contract with us for the period covered by dates and times";
00340 PRINT #1," entered"
00350 PRINT #1,"above by our Service Technician.  Your invoice will then show";
00360 PRINT #1," original contracted charges, plus subsequent accrued charges."
00370 PRINT #1,
00380 PRINT #1,CHR$(14)"SERVICE TECHNICIAN:  "CHR$(20)"Fill out form complete";
00390 PRINT #1,"ly, date and sign it.  Have customer's representative read and"
00400 PRINT #1,"sign it.  Give original to customer.  Return carbon copy and ";
00410 PRINT #1,"your expense report to our billing department.  List all time"
00420 PRINT #1,"worked, including starting and finishing times. "CHR$(14)"BE ";
00430 PRINT #1,"ACCURATE."
00440 PRINT #1,CHR$(27)"H":CLOSE #1:RETURN
02000 FOR Z=1 TO 80:PRINT #1," ";:NEXT Z:PRINT #1,:PRINT #1,:RETURN

```

PRECISION COMPUTER EQUIPMENT SERVICE CO.
A Healthy Computer Pays For Itself!

>> S E R V I C E R E P O R T <<

Customer	Complaint
Address	P/O Number
Phone	Remarks
Contact	
Service Tech. Check in/out time/date	
Work done	
Svc Tech sign	Customer

CUSTOMER PLEASE NOTE: This report is used for billing purposes. If service call exceeds contracted time, form becomes a one-time-only addendum to your original contract with us for the period covered by dates and times entered above by our Service Technician. Your invoice will then show original contracted charges, plus subsequent accrued charges.

SERVICE TECHNICIAN: Fill out form completely, date and sign it. Have customer's representative read and sign it. Give original to customer. Return carbon copy and your expense report to our billing department. List all time worked, including starting and finishing times. **BE ACCURATE.**

Figure 3: This is the output of Listing 3, showing a sample form. You can modify the program to produce your own forms. (Reduced 25% in size.)

PAST PRESENT FUTURE

QUIKDATA has been there in the **past**. In fact, we're the oldest independent H/Z vendor in the business, serving thousands of satisfied customers every year! We're still here now, the **present** - And it's not by luck or chance. It's only because of our customer's trust in us. Why? Dedicated service; 24 hour order shipping turnaround; total support; full consultation; dependable fact filled monthly newsletter to give you the whole **SCOOP**; Much more. The **future**? We'll be right there to hold your hand, just like now - just like in the past. That's our promise. We won't leave you stranded. Join the thousands of satisfied customers who choose **QUIKDATA** as their one stop headquarters - join the **WINNERS**!

DISK DRIVES

We carry a full line of disk drives, cabinets, cables and diskettes

Tandon TM100-1 SS ST	\$185
Tandon TM100-2 DS ST	\$235
Tandon TM100-4 DS DT	\$275
Tandon TM101-4 DS DT	\$305
Tandon 848-2 8" DS thinline	\$420
Mitsubishi M4851 5" ST thin	\$250
Mitsubishi M4853 5" DT thin	\$300
Single 5" cabinet	\$59
Dual 5" cabinet w/cables	\$195
Dual 5" thinline cabinet	\$95
Dual 8" thinline cabinet	\$210

WORD PROCESSING

SPELLBINDER word processor	\$269
H89 custom keyset for SB	\$37
THE WORD PLUS spell checker	\$125

SOFTWARE

WORD PROCESSOR (Bible Study)	\$179
Lucidata Pascal HDOS & CP/M	\$50
Elektrokonsult CP/M Utilities	
Exclusive distributor for UltiMeth	
Skill Data *Key series software	
Livingston Logic Labs software	
Software Wizardry products	

WINCHESTER

15 MEG HARD DISK FOR H8 & H89:
Subsystem ready to plug in and go - \$1595.

HDOS & CP/M software for up to 15 user defined partitions - \$149

Host Adapter cards available for H8 and H89

DATABASE

dBII CP/M & ZDOS	\$449
FRIDAY! database program	\$195
DBPlus for dBII	\$99
QUIKMAIL dBII mail list prog	\$49
QSALE inventory/POS dBII	\$89

HARDWARE

Magnolia 77316 DD board	\$419
MMS CP/M+ with 128K RAM	\$525
MMS H89 16K upgrade RAM	\$89
DAISYWRITER 2000 printer	\$1149
SCOOTER SPIKE PROTECTOR	\$47
VOTRAX PSS	\$319
MEMORY CHIPS, FANS, RS232 LINE MONITORS, VIDEO BLANKERS, KRES products, BOOKS, MANY MANY OTHER PRODUCTS - CALL OR WRITE FOR FREE CATALOG, OR FOR MORE INFORMATION ON ANY OF OUR PRODUCTS	

H-SCOOP

The most complete independent newsletter supporting the H8, H89 and Z100 series of computers. GET THE SCOOP today, and get the most from your computer tomorrow.
RATES: \$20 for 12 issue year USA, \$27 foreign AIR MAIL



QUIKDATA, INC.

2618 Penn Circle
Sheboygan, WI 53081
(414) 452-4172



VISA and MASTERCARD

"Quality Software at Reasonable Prices"

SOFTWARE FOR YOUR H8/H89

HDOS Products

TEXT PROCESSOR 4.1 FULL SCREEN EDITOR	\$ 59.95	
TOUCH TYPIST 2.0	\$ 29.95	
VIDEO ARTIST PLUS, H19 GRAPHICS PROGRAM	\$ 39.95	
H25/Z25 GRAPHICS GENERATOR	\$ 44.95	
TOUR-700 GAME	\$ 19.95	
UNIVERSAL SPOOLER	\$ 29.95	
RESISTIVE NETWORK DESIGN	\$ 24.95	
MX-80 DEVICE DRIVER	\$ 29.95	
MODEM COMMUNICATIONS DEVICE DRIVER	\$ 34.95	
MBASIC COMPUTER-AIDED-INSTRUCTION	\$ 59.95	
HERO-1 ASM-68 6800 CROSS ASSEMBLER	\$ 59.95	
DENSE-PAC DATA COMPRESS AND ENCRYPT	\$ 29.95	NEW
UD.DVD UNIVERSAL PRINTER DEVICE DRIVER	\$ 29.95	
MX.DVD MX-80 DEVICE DRIVER	\$ 29.95	
H25.DVD H25 DEVICE DRIVER	\$ 29.95	
UD.DVD/SPOOLER	\$ 39.95	
MX.DVD/SPOOLER	\$ 39.95	
H25.DVD/SPOOLER	\$ 39.95	
SUPER SYSMOD 2	\$ 29.95	
TINY PASCAL & DISASSEMBLER	\$ 29.95	
HFORTH-79	\$ 34.95	
DIAMOND ACCOUNTING SYSTEM	\$ 74.95	
The ILLUSTRATOR GRAPHICS PROGRAM	\$ 89.95	NEW

CP/M Products

TEXT PROCESSOR 4.1 FULL SCREEN EDITOR	\$ 59.95	
TOUCH TYPIST 2.0	\$ 29.95	
TOUR-700 GAME	\$ 19.95	
DOMESTIC MGT. SYSTEM	\$ 39.95	
CHECK PROCESSOR	\$ 29.95	
TAXTIME 1983 FEDERAL INCOME TAX PROGRAM	\$ 59.95	NEW
SNAP	\$ 29.95	
MBASIC COMPUTER-AIDED-INSTRUCTION	\$ 59.95	
HERO-1 ASM68 6800 CROSS ASSEMBLER	\$ 59.95	
DENSE-PAC DATA COMPRESS AND ENCRYPT	\$ 29.95	NEW
SUPERMATH 1 COMPUTER-AIDED-INSTRUCTION	\$ 39.95	
UD.COM/SPOOLER	\$ 39.95	
TINY PASCAL & DISASSEMBLER	\$ 25.00	
dBASE II	\$465.00	
BOTTOM LINE STRATEGIST	\$299.00	NEW
FINANCIAL PLANNER LANGUAGE	\$499.00	SPECIAL
FRIDAY	\$219.00	NEW

SOFTWARE FOR YOUR Z-100

ZDOS Products

Z-100 HDOS 2.0 UPGRADE	\$ 79.95	SPECIAL
SAVE \$60 . . . includes FREE Z-100 HDOS Text Processor		
TEXT PROCESSOR 4.1 FULL SCREEN EDITOR	\$ 59.95	
TOUCH TYPIST 2.0	\$ 29.95	
CHECK PROCESSOR	\$ 29.95	
dBASE II	\$465.00	
SUPERMATH 1 COMPUTER-AIDED-INSTRUCTION	\$ 49.95	NEW
BOTTOM LINE STRATEGIST	\$299.00	NEW
DIAMOND ACCOUNTING SYSTEM	\$149.95	
FRIDAY	\$219.00	NEW
The ILLUSTRATOR GRAPHICS PROGRAM	\$ 89.95	NEW

CP/M-85 Products

TEXT PROCESSOR 4.1 FULL SCREEN EDITOR	\$ 59.95
TOUCH TYPIST 2.0	\$ 29.95

Newline's Z-100 HDOS 2.0 Products

TEXT PROCESSOR 4.1 FULL SCREEN EDITOR	\$ 59.95
UD.DVD UNIVERSAL DEVICE DRIVER	\$ 29.95
MX.DVD MX-80 DEVICE DRIVER	\$ 29.95
H25.DVD H25 DEVICE DRIVER	\$ 29.95
UD.DVD/SPOOLER	\$ 39.95
MX.DVD/SPOOLER	\$ 39.95
H25.DVD/SPOOLER	\$ 39.95
SUPER SYSMOD 2	\$ 29.95

SOFTWARE FOR YOUR HERO-1

KEYPAD UTILITY CASSETTE	\$ 24.95
HERO-1 ASM68 available for HDOS & CP/M	

Specials

TEXT PROCESSOR 4.1 for ZDOS & CP/M-85	\$ 99.95	SPECIAL
Z-100 HDOS 2.0 with FREE Z-100 HDOS Text Processor	\$ 79.95	SPECIAL
FINANCIAL PLANNER LANGUAGE	was \$549.00 \$499.00	SPECIAL

Nashua Diskettes

SSSD, 10 sector Hard	10 for \$25.00, 20 for \$45.00
SSSD, soft	10 for \$25.00, 20 for \$45.00
DSDD, soft, 48 TPI	10 for \$33.50, 20 for \$62.00
DSDD, soft, 96 TPI	10 for \$42.00, 20 for \$79.00
8", DSDD	10 for \$48.00, 20 for \$91.00
CALL FOR QUANTITY PRICING.	

Newline Software

SEND FOR LATEST CATALOGUE

P.O. Box 402 • Littleton, MA 01460 617-486-8535

ORDER FORM

FOREIGN ORDERS—Surface postage included in price. Add \$3.00 per package ordered for airmail shipment. Checks drawn on a non-U.S.A. bank must include \$10.00 for check processing and funds transfer.

CANADA ORDERS—Checks drawn on a non-U.S.A. bank must include \$3.00 for check processing and funds transfer.

Mail to: Newline Software
P.O. Box 402
Littleton, MA 01460

OS = Operating System—Enter either HDOS, CP/M, Z-DOS, or CP/M-85. Be sure the product you are ordering is available for the OS you select.

Format = 5.25" Hard Sector (H17 Format) . . . use format code "H".
5.25" Soft Sector (H37 Format) SSDD, 48TPI . . . use format code "S".
8" SSDD (H47) Format . . . add \$5.00 . . . use format code "8".
Z100 Software is in DSDD, 48TPI format. . . use format code "Z".

Quantity	Product Description	OS	Format	Each	Extended

S12-83

Massachusetts residents must include 5% Massachusetts Sales Tax.

SUB TOTAL

MASS. SALES TAX 5%

TOTAL

☐ Please send latest product catalogue.

NAME _____

STREET _____

CITY _____ STATE _____ ZIP _____

Circle #145 on Reader Service Card

CHUGCON 83: Sharing Expertise

The world's largest local Heath Users' Group brought together users from the region and vendors from around the country.

Frederick Zimmerman

The Capital Heath Users' Group held its second annual conference, CHUGCON 83, on Saturday, October 22. It took place at the Tyson's Westpark Hotel in suburban Tyson's Corner, Virginia, just outside Washington, D.C. The conference ran the whole day, so I got to attend a full program of high-quality conference activities. I thought CHUG did a thoroughly professional job of organizing its regional users' group conference.

Over 600 people came to CHUGCON 83. More than 30 vendors showed Heath/Zenith hardware and software products in a crowded exhibition hall. (CHUG officials had to turn down at least a dozen vendors who wanted to exhibit at the last moment.) Technically knowledgeable CHUG members shared their expertise in seminars on subjects such as Z100 hardware and software, dBASE II, and the programming language C.

CHUG also arranged for speakers at lunch and dinner. Dr. Ruth Davis, a respected figure in the world of mainframe computing, gave a luncheon speech in which she shared her opinions about the role of

microcomputer users' groups in social change. The first speaker at the CHUG dinner banquet, HUG software developer Terry Jensen, offered some well received inspirational remarks. And the second speaker at dinner, HUG manager Bob Ellerton, announced that the Heath Company is giving members of the national HUG a discount on all Heath/Zenith computer products.

The exhibition area

I thought the most noteworthy aspect of the exhibition area was that it was about as large as the vendor exhibit at the first National Heath Users' Group Conference, HUGCON 1, held in Chicago in August 1982. The exhibition room itself was, if anything, slightly nicer than the room for HUGCON 1. There were fewer attendees at CHUGCON 83, but about the same number of vendors—many of whom travelled a considerable distance to exhibit.

For example, Trionyx Electronics came from California; Hoyle & Hoyle Software and GROFFics came from



Photo by Elizabeth Saxon



Photo by Elizabeth Saxon

The theme of CHUGCON 83 was "educational and scientific interchange". In the photograph at left, Steven G. Meyerson (left) discusses his *dBASE II Programmer's Notebook*, a 46-page "collection of techniques and hints . . . used in writing programs in dBASE II." (\$12.95, P.O. Box 2027, Poquoson, VA 23662.) In the photograph at right, Bob Shon (center) and another CHUGCON attendee examine a sheaf of technical literature picked up from CHUGCON vendors. Larry Sites (left), who built his first Heathkit in 1949, evidently has some comments to offer.

HEATH/ZENITH SPOKEN HERE...

ZENITH LOW PROFILE COMPUTERS

ZF-100-21 Single 320KB disk drive, 128K RAM. Retail \$2,899.00, call for lowest price.
ZF-110-22 Two 320KB disk drives, Color Graphics, 128K RAM. Retail \$3,499.00, call for lowest price.
ZW-110-32 Internal 11 MEG Winchester hard disk drive, One 320KB disk drive, Color Graphics, 192KB RAM. Retail \$5,499.00, Payload Price \$4,172.00

ZENITH ALL-IN-ONE COMPUTERS

ZF-120-22 Two 320KB disk drives, 128K RAM. Retail \$3,599.00, call for lowest price.
ZW-120-32 Internal 11 MEG Winchester hard disk drive, One 320KB disk drive, 192KB RAM. Retail \$5,599.00, Payload Price \$4,228.00

PERIPHERALS AND ACCESSORIES

ZVM-135 High Resolution Color Monitor with Cable \$594.00
ZVM-122 High Resolution Amber Monitor \$165.00
ZVM-123 High Resolution Green Monitor \$135.00
Z-89-37 Zenith Double Density Controller \$265.00
Magnolia Microsystems Double Density Controller. Supports both 5¼" and 8" disk drives. Complete setup including CP/M 2.242 \$354.00

DISK DRIVE SYSTEMS

Two Tandon 8" **TM848-2** Thinline, Double Density, Double Sided Drives in Deluxe Cabinet with Heavy Duty Power Supply and Cooling Fan. 2.4 MEG Storage Total. With Cable Ready for H/Z-100 as is or H/Z-89 with Magnolia Board. \$1,135.00
H/Z-89 Internal Dual 5¼" Drive Set. Two **QUME TRAK 142-A2**, ½ Height Drives with All Hardware and Connectors to Easily Mount Inside H/Z-89. Drives are Double Sided, Double Density, 6MS seek. 640KB Total Storage. Requires Soft Sector Controller (Magnolia or Zenith). \$455.00

TANDON DISK DRIVES at lowest prices. 90 day warranty

TM100-1 5¼" Single Side, Double Density, 48 TPI \$194.00
TM100-2 5¼" Double Side, Double Density, 48 TPI \$245.00
TM100-4 5¼" Double Side, Double Density, 96 TPI \$295.00
TM848-2 8" Thinline, DS, DD, 48 TPI \$445.00
MITSUBISHI M4853 ½ Height, DS, DD, 96 TPI ... \$295.00
SHUGART SA455 5¼" ½ Height, DS, DD, 48TPI ... \$265.00

SPECIAL SALE Zenith SuperCalc and Microsoft BASIC Interpreter for CP/M, below dealer cost. Our price \$60 each while current stock lasts. Please specify disk format.

Z-100 16 BIT SOFTWARE ZDOS Required (sold below)

	LIST	OUR PRICE
LOTUS 123	\$495	\$445
PEACHTEXT 5000 Starter Pkg.	\$395	\$270
WORDSTAR Color Word Processor	\$399	\$325
MAILMERGE for Word Star	\$139	\$125
SPELLBINDER Word Processor	\$395	\$285
dBASE II	\$695	\$460
CONDOR 2 Rel. Data Base Management	\$650	\$494
CONDOR 1 File Manager	\$299	\$245
ADVANCED MULTIPLAN	\$250	\$228
Z-DOS 16 Bit Operating System	\$150	\$135
Z-BASIC	\$150	\$135

PAYLOAD COMPUTER SERVICES

Charles C. Porter, Proprietor
 15006 Sun Harbor, Houston, Texas 77062
 Phone (713) 486-0687

Your satisfaction is guaranteed. All prices are discounted for payment with order. VISA and MASTERCARD orders please add 3%. Please add \$5.00 to each order for handling and shipping. We pay the balance. THANK YOU.

Tutorials and demonstrations at CHUGCON

Speaker	Topic
Bob Shon	Computer Video Generation
Carl Fosler	Low Cost Data Base Management System Software
Ray Cherry	Introduction to C
Don Lewis	Public Domain Software—for the new user
Arthur Goldsmith	dBASE II Beginner
Robert Todd	Public Domain Software—for the experienced user
Mike Supley, Chair	Open Forum: Future Directions for CHUG
Bill Johnson	Genealogy and Computers
John Stetson	Z100 Software
Paul Beck	dBASE II Advanced
Mike Cogswell	Z100 Hardware
Leon Wittwer	Improving the H89
Terry Jensen	HUG Presentation

North Carolina; Technical Micro Systems, Inc., came from Ann Arbor, Michigan; Husker Systems came from Nebraska; New Orleans General Data Services came from Louisiana; and Extended Technology Systems from Pennsylvania.

Not everyone had to travel so far to exhibit. Many CHUG members were exhibiting products, and several local computer distributors had booths.

GROFFICS had my favorite booth decoration, a Space Shuttle balloon hanging from the ceiling. Presumably, it was there to draw attention to the debut of Shuttle Lander, their flight simulator program which runs under the Heath Disk Operating System (HDOS).

Learning from CHUG's experts

CHUGCON attendees had a choice of two different seminars every hour from 8:30 to 5:00. These tutorials and demonstrations covered a wide range of hardware and software subjects. (A list of topics and speakers accompanies this article.) Of the ones I attended, I thought Ray Cherry's "Introduction to C" was the most entertaining. I liked his capsule description of C: it's like a powerful Kawasaki 1200 motorcycle—"with no brakes."

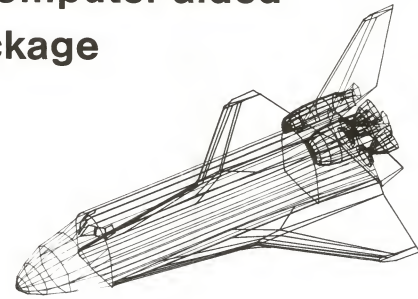
Luncheon: Dr. Ruth Davis

Dr. Ruth Davis has been director of the National Bureau of Standards' Institute for Computer Sciences and Technology; Deputy Under Secretary of Defense for Research and Advanced Technology; and Assistant Secretary of Energy for Resource Applications. She's now president of her own company, The Pymatuning Group, Inc., which specializes in science and technology management and development strategies. In short, an impressive speaker for a regional users' group conference!

The gist of her occasionally rather rambling remarks was that 1) microcomputers are changing the nature of our society; 2) economists, historians, and other social scientists don't understand those changes at all; and 3) computer hobbyists will be the first to know about such social changes. Computer hobbyists, Davis concluded,

Engineers: Now you can do high-level computer-aided design with a sophisticated software package created especially for your Z100

CADC brings high-level computer-aided design and computer-aided manufacture (CAD/CAM) into the price range of engineering students and small-scale design shops—while taking advantage of the exceptional color resolution and powerful capabilities of the Z100.



With CADC, you can:

- create full-color 3-D models and 2-D drawings to any scale or size for your most complex design projects
- edit, merge, and store your models in a data "library" for future use
- add notes and dimensions to your graphic designs to define your model
- record the various stages of your project by outputting your designs to a plotter or printer-plotter *at any time* during the design process
- assign and compute the properties of your model
- analyze the structure of your model

CADC:

- uses the basic geometric elements and sets, including lines, points, circles, arcs, conics, splines, surfaces of revolution, projected entities, and mirroring of geometry
- has applications in your engineering field, whether it's mechanical, architectural, electrical, chemical, structural, or civil engineering

The CADC design package is composed of 5 modes:

1. Model Mode

- provides graphics menus for you which supply information about your cursor status, your options for further steps, and your present position in the CADC system
- gives you flexible operation, with three ways to enter data:
 - move the graphics cursor using the arrow keys
 - enter numeric values from the keyboard
 - enter geometry or commands using a digitizing tablet
- gives you full control over your design with 3-D zoom, translate, and rotate facilities, full perspective display, full stereo image, and layering to position figures in relation to one another

2. Properties Mode

- determines physical properties according to the material densities you assign
- calculates the weight and center of mass of your model
- computes properties of an arbitrary plane domain

3. Detail Mode

- adds notes and dimensions to the model data base to define your model design
- plots notes in nine sizes
- notes files are composed of ASCII characters, and can be modified by most major word processing systems

4. Plot Mode

- plots all CADC models, dimensions, and notes in full color, with high precision to any scale
- designed for use with Houston Instruments' HILOT DMP-29 Multi-Pen Plotter or DMP-41

5. Space Frame

- lets you perform finite element analysis on your model
- calculates element forces, node displacements, nodal loads and reactions
- lets you overlay the displacement file with your designed model to show the deflections calculated
- lets you analyze 2-D frame and grid structures and 3-D frame and truss structures using beam and rod elements

Minimum configuration necessary:

Z100 with color graphics
1 floppy disk drive
192K of memory
Z-DOS

Recommended:

1 Winchester disk drive
Houston Instruments
HIPAD Digitizer
Houston Instruments
DMP-29 or DMP-41 plotter
MX-80 or MX-100 printer

CADC Model Mode—\$995; Properties Mode—\$195; Detail Mode—\$295; Plot Mode—\$195; Space Frame—\$495; all five programs are available for \$1995, a savings of \$180. CADC Model Mode and Space Frame can run independently of the other modes, and may be purchased separately. The user who wants a system just to produce drawings need only purchase Model Mode, Detail Mode, and Plot Mode.

A demonstration disk of CADC Model Mode is available for \$75. It has some limitations in data base structure, but all geometric entities are demonstrable. The \$75 payment will be applied to all purchases of the actual system. Please enclose \$5 for shipping the demonstration disk. The disk is a 320K floppy.

CADC is priced for a single computer software license. Sales tax will be added where applicable.

Send all orders and inquiries to: CIMS, Inc., 20859 Old Spanish Trail, New Orleans, LA 70129, 504/254-0545. Dealer inquiries are invited.

Ordering Information

I want to do high-level CAD/CAM on my Z100

— Send me the complete CADC package for \$1995.00. I save \$180.00.

— Send me the following modes for the CADC system:

- Model Mode @ \$995 (will run independently of other modes)
- Properties Mode @ \$195
- Detail Mode @ \$295
- Plot Mode @ \$195
- Space Frame @ \$495 (will run independently of other modes)

(For a system to produce only drawings, you'll need Model, Detail, and Plot Modes only.)

— Send me the demonstration disk for CADC Model Mode for \$75 plus \$5 for shipping. My payment will apply to all purchases of the actual system.

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Mail this coupon with your check or money order today to:

CIMS, Inc.
20859 Old Spanish Trail
New Orleans, LA 70129
504/251-0545

DEALER INQUIRIES INVITED

"are the kernel, the core, of a kind of world that nobody has described."

HUG to CHUG: Do good

HUG software developer Terry Jensen is also a system operator on the Heath Users' Group Special Interest Group bulletin board on CompuServe's MicroNet. The HUG bulletin board plays a very important role in maintaining a sense of community among Heath/Zenith users. So it's particularly noteworthy that the most important message of Jensen's dinner speech was that Heath/Zenith users should not allow their community to become an exclusive clique for computer hobbyists only. Rather, Jensen argued, users' groups have a special responsibility to inform the general public about computers. His message was well received by the CHUG audience, which gave him the strongest applause of the day. (Excerpts from Terry's remarks accompany this article.)

HUG discount

The next speaker, National Heath Users' Group Manager Bob Ellerton, had welcome news for members

of the national HUG: the Heath Company is now giving HUGgies a discount on Heath/Zenith products. Anyone who has been a member of the national HUG for 90 days or more is entitled to a 10% discount on all computer-related Heathkit products, and a 20% discount on all Heath Company wired computer products purchased through the local Heathkit Electronic Center or through mail order from Heath.

Ellerton said the HUG discount is a bottom-line discount, which means that it takes effect *after* any other discounts are applied. He supplied further details: the maximum purchase per year to which the discount may be applied is \$5,000, and the HUG member may not apply the discount to more than one unit of each item purchased. ("You can't go out and buy three Z100s or anything like that.") HUG members will be issued new ID cards over the course of the next year, and equipment purchases will be recorded on the back of the new cards. Finally, the discount was to become effective as of December 1, 1983.

Ellerton said he believed that the discount for HUGgies "was brought about by the last two years of outstanding response to the national Heath Users'

Reach Out and Teach Someone

Terry Jensen

I would like to be serious for just a few moments and address two issues which I feel are important to each of us. Both of these issues relate to communication. At the conclusion of discussing these issues, I also would like to present a charge to you as a group and to you as individuals.

How many of you this evening have owned a computer for over, let's say, one year?

How many have owned a computer for over two years?

How many have been hackers for over three years?

I wonder how many of you have taken a microcomputer-related class to help you learn how to use your computer? Not a computer class but a *microcomputer-related* class?

I believe we would find if we took a poll that the longer you have owned your computer, the less likely it is that you have taken a *microcomputer-related* class. Most of the "hackers" have learned by jumping in there and trudging along.

How many of you hackers remember what it was like the first few months you had your computer? It was fun! Frustrating! Exciting! It was a mixture of many emotions. One session you added on that new board, the next session a new disk drive, and the next session you were boosting the power supply. One minute you were typing in a program, the next minute you were debugging the program.

For the past several months, I have had the opportunity of teaching

microcomputer-related classes in the evening hours. Sixty-five percent to 70 percent of the students are over 40, with many of them presently retired. Sixty-five to 70 percent are women. (You may be interested in knowing that 10 to 15 percent of the students are teachers.)

What do you think are the two most popular responses to the question, "Why are you taking this class?"

"I want to know what these computers are all about."

"My kids or my grandkids are using the computer and I want to have an idea what is going on."

The large majority of people today do *not* understand what is "going on" with computers. They are afraid of computers. Most of these people are going to remain illiterate (computer speaking), because they are either not in a position to learn, or they don't want to learn, or they do not know how to learn what a computer is capable of, as the true hacker has learned. This new influx of unlearned and unprepared computer users has and will continue to change the way that we, the "experienced" users, confront or communicate with new computer users.

The person purchasing a computer today, generally speaking, expects the computer to do wonders at the press of a key. We, as computer hackers, know this is not the case. Many hours, days, months, and years go into the design and implementation of computer hardware and the software that produces an

accurate and pleasing result. Miracles do *not* happen overnight. It is not just the press of a key that produces; it is only long hard work by engineers, designers, software writers, or what have you, that "produces."

But the computer buyer of today does not know that! He expects the computer to produce and to do it his way and it must be done now!

Is he missing the boat? Is he missing the whole picture? Sure he is! But why should he know better? How can he know the whole picture?

I guess that comes down to us! Those of us here in this room—those of us who have had a computer for more than one year—it is our responsibility to tell him! As we come in contact with this person maybe only one time or maybe day after day, we must remember his vantage point, we must be able to relate to him. Then we can begin to teach or communicate to him how to understand his computer.

But how can we do this?

Each time we are in contact with a new computer user, we must remember what it was like when we first began hacking on our computer. We must understand what he sees. We must begin to explain and educate (if you will) this person "bit by bit." Each time we help this user, he will come one step closer to understanding the "whole picture."

On the other side of the coin, we have the second issue. What do we do with the likes of the "414s"? (As you recall, they are the group of boys and

Group Conference and conferences like CHUGCON." Ellerton said that Bill Johnson, the president of the Heath Company, sent a memo to Joe Schulte—president of Veritechnology, the corporation which runs the Heathkit Electronic Centers—and Dave Altwies, Heath's director of marketing. Johnson told them: "Figure out how to do this." So, Ellerton said, "We sat down and argued it out." Perhaps with an eye towards pleasing his audience, he added: "Of course, I tried to get a lot more than we got."

Bob was in an expansive mood. There has been a lot of good news lately for the Heath Company and Zenith Data Systems. For example, Ellerton mentioned the contract whereby Heath/Zenith is selling 6,000 Z100s to the Air Force, Navy and Marine Corps over the next three years. (For further information, see *Sextant* #8, Winter 1984, or issue 77 of *Buss: The Independent Newsletter of Heath Co. Computers*.) He also mentioned that advertisements for Zenith computers have begun appearing on national TV. "The changes around the Heath Company, just the personal changes, since the announcement of the Air Force contract" and "the national Z100 commercials on TV ... have done a lot for

the morale of the entire building. And believe me, the computer being built today is going to be a better computer for it. It won't stop."

Morale may have improved at Heath, but some things never change: the company is still holding firm to its policy of not discussing future products. In the question and answer session that followed his prepared remarks, Ellerton warned the CHUGCON audience that HUG is "walled off" from information about future products. "We've put ourselves in a unique position at HUG. We don't want to know, because Buss will tell us anyway."

As usual when Heath users gather, a HUGgie started things off by asking when we would see the long-awaited version 3.0 of HDOS. The gist of Ellerton's answer was "we're working on it." Then a few people asked questions about the mechanical details of the HUG discount program, and Ellerton assured them that Heath would implement the program in an equitable fashion.

The most interesting question of the evening came from Mike Cogswell, CHUG's Z100 hardware expert. He has a record of seeming well-informed about the

young men of the Milwaukee area, tapping illegally into computer systems.) How do we deal with young people who have the ability to learn quickly and yet do not have the supervision to give them proper direction?

Maybe there is a lesson here for us to learn, also.

Sure, these computer "tappers" are making their way into "no trespassing" areas. Yes, they are showing us that our present computer security systems are inadequate. However, a faulty security system is not the issue.

It obviously is not right to allow sabotage in order to find weak coding. This may show us that improvements, quick improvements, are needed to implement high level security systems. If young experimenters playing with remote computers are successful in tapping defense systems, then who knows who else may be accessing those systems? But then espionage is not the issue, either.

What is the issue?

We have a responsibility to do something before this type of action takes place. We must set up a line of communication with these young people.

How can we do that?

First, we need to be aware that this type of playing around is *not* validated. Second, we need to understand that the "kid next door" may be the *next* young person trying to access a computer system illegally.

With these two thoughts in mind, we must strive to point and *help* young people to stay within legal boundaries. We must *encourage* them to find areas of interest which produce construc-

tive results, not *destructive* results. We must try to *involve* them in design projects, which result in building better computer systems. But most of all we must *direct* them by building in them an upright character.

Help, encouragement, involvement, and direction—we can only do these if we are communicating with them.

Having investigated both extremes: computer illiterates, on one hand, and those who know "too much" for what they are capable of controlling, on the other, we can see that there are people of all ages and of various computer expertise levels who need our help and direction.

When the S.S. *Titanic* struck an iceberg on her maiden voyage in 1912, James Kruch of Chicago was on board. He survived this harrowing experience. Then, when German submarines torpedoed the S.S. *Lusitania* in 1915, Kruch was again on board a doomed ship. For the second time he was rescued, surviving two great sea tragedies. Yet years later, when he was crossing a shallow stream, Kruch collapsed and drowned. This man, who had survived two ocean ship sinkings, lost his life in less than one foot of water.

Berkeley was an explorer, mountain climber, and big game hunter. He had shot lions and tigers and other dangerous animals, chalking up quite a record for himself. Yet he died, not by the claws of a charging lion or the cunning stealth of a man-eating tiger, but from the scratch of a barnyard cat! Blood poisoning set in and killed him.

Blondin made crowds gasp and ap-

plaud when he walked over Niagara Falls on a tightrope. He was perhaps the greatest tightrope walker who had ever lived. Few feats of daring had been seen to compare to it. He was hailed as the "Conqueror of Niagara." Yet Blondin's death was hastened by his tripping over a doormat outside his own house!

The point: "little things" can make a difference! Little things can have a big effect on those around us ... including anyone who uses computers.

If it is truly our desire to help others, we must place ourselves at their level of understanding. We must show them we can relate to their misunderstandings and misfortunes. We must show them that we care that they learn. Then we can begin to communicate with them.

My charge to you as a group and to you as individuals is to watch for, and to be open to, any computer user that you come in contact with, and guide them toward a better and clearer understanding of their computer and the responsibility that they should accept toward other computer users. That person could be a quiet visitor who drops in on a CHUG meeting—it could be the retired grandparent who lives just down the street—or it might be the neighbor kid who bugs you about playing games on your computer.

If we do not take the initiative to communicate with these people in understanding the "whole picture" and in understanding their responsibility to other computer users ... *who will???*

EDT is NOT a Word Processor

The "microcomputer revolution" has brought us programs which do an excellent job of removing the obstacles in the flow of language from the human mind to the printed page. These word processors usually include operational modes which allow them to be used to create program source code. The "non-document" modes are secondary to the purpose of these processors, however, and are often inefficient and filled with traps for the unwary.

EDT is a Program Text Processor

In the same way that word processors have been designed for document preparation, EDT has been designed for software preparation. Numerous features have been included to add efficiency to the software creation process, particularly the creation of high level language source code. Also, all internal and disk file operations have been designed for speed, to insure that making even small changes to a program is not a burdensome task.

EDT's Features Include:

- Extensive utilization of your keyboard's special function and feature keys
- Full Screen entry and manipulation of text
- Editing two files simultaneously with unrestricted text movement between files
- File size limited only by disk space
- Line by line automatic indentation with controlled adjustment of the indentation of blocks of lines
- Block copies, block moves, block deletes, and positioning by block marker
- String searching and string search and replace
- Full screen disk directory operations
- A user modifiable full screen help facility

EDT requires 128 K bytes of system memory and is available for many MS-DOS machines including the IBM PC (PC DOS), the Zenith Z-100 (ZDOS) and the Seattle Gazelle (MS-DOS).

EDT \$55.00
and for CP/M and HDOS machines we have . . .

LUCIDATA PASCAL

This full featured Pascal system is available at a lower price than systems with much less to offer. Ideal either as a learning tool or a working tool.

Lucidata Pascal for HDOS or CP/M \$55.00

All orders shipped within 72 hours of receipt. Send check or money order to:

POLYBYTES

3427 Bever Avenue S.E.
Cedar Rapids, Iowa 52403
319-366-3077

inner workings of Heath and Zenith Data Systems.

"What about the Z3?" Cogswell asked. First, Ellerton pretended that he'd never heard of the Z3 ("who?"). Then he read a rather cryptic statement he'd prepared on the subject of future products: "the hardware gurus are guru-ing away."

What's all this about gurus and Z3s? Well. . . we've heard talk that "Z3" is the internal code name for Zenith's next computer, and there've been persistent rumors that Zenith is working on an IBM PC "clone."

Sending them away happy

The exhibitors donated about fifty door prizes, which were given away at the end of the dinner banquet. (A few were also given away at lunch.) Most of the prizes were worth between \$25 and \$100, and there were only 240 people in the banquet room, so a lot of people went away happy. The most valuable prize was a pair of 8" disk drives, donated by Floppy Disk Services. As chance would have it, the drives were won by Sam Yates, one of the primary organizers of CHUGCON 83. Judging by the hearty applause, most CHUG members thought this was an appropriate reward.

Organizing CHUGCON

After the conference was over, I talked to some of the organizers of CHUGCON. Mike Supley was the chairman of the CHUGCON steering committee, and is now the president of CHUG. I asked him if he had any advice for people who might be interested in organizing their own regional conferences.

First, Supley said, you should have a general theme for the conference. In the case of CHUGCON, the theme was educational and scientific interchange about Heath/Zenith computers. Second, you should start planning early. Third, you should establish a steering committee, and pick chairmen for various subcommittees.

To make everything work, you need to have "very regular" meetings of the steering committee. "We did a lot of telephone talking back and forth." But you don't want to get good communications at the price of individual initiative and delegation of authority. Supley thought that the chairman should not try to be "the person with all the ideas." Rather, the chairman should try to "coalesce the ideas" of the group.

"Draw from the strengths of the people," he said. "You should give the subcommittee chairmen the authority they need to execute their jobs."

I also talked to Sam Yates, the chairman of the vendor subcommittee. It's extremely important to persuade vendors to attend, Yates said, because the vendor area is responsible for drawing 80% of those who attend. The most difficult task is communicating to vendors that it will be worthwhile for them to attend. You need to be able to deal with vendors in their own terms, on a basis of mutual respect. "Relevant personal contact is your key." Yates ran up at least \$100 in phone bills while organizing the vendor area for CHUGCON 83.

Was all the work worth it? Mike Supley noted that "over 600 people with technically oriented interests" came to see "state-of-the-art technology." Supley's theme for the conference was "educational advancement." By that criterion, CHUGCON 83 was undoubtedly a success.

Yates, like everyone else I talked to, agreed that the

LINDLEY SYSTEMS

Lindley Systems 21 Hancock St. Bedford, MA 01730
(617) 275-6821 3-10 PM. Specify soft or hard sector 5.25" disk.

THE ULTIMATE PRINTER DRIVER! Specify CPM or HDOS. Not for Z-100.
-Runs the printer with standard cable - set switches and print!
-Controls all functions from keyboard or file: tilde('~') = CTRL key
-Special codes for overstriking and ignoring of linefeeds.
-HDOS: SET HELP displays current settings; CTRL-P for screen copy
-CPM: CTRL-W online set commands, CTRL-P for screen copy
-Initialization sequences may be set as desired.
-Assembly settable for these interfaces: Z-89-11, H/Z-88-3, H-8-2, H-8-4, H & H, FBE, H-8-5, and \$25 parallel (schematic included)
-Specify EPSON MX,FX,RX, Gemini 10/15, C.Itoh 8510, NEC-PC8023, MPI 99 or 150, or Microline. Source code incl. for all drivers.
+\$20.00 postpaid. State CPM or HDOS. Write for custom drivers.

Diamond ACCOUNTING SYSTEM specify HDOS or H/Z-100 ZDOS
> Complete A/R, A/P, and G/L; auto double-entry; menu-based format.
> Wide variety of reports: aging, overdues, unpaid invoices, balance sheet, P&L report, checks, audit trails, G/L reports, etc
> ANY report selectable to screen or printer output.
> Bad entries may be changed or deleted, even in journals.
> Inventory and other Peripheral Programs now available in ZDOS.
> Complete manual available for \$15; deducted from purchase price.
+\$75 ppd. for HDOS; \$150 for ZDOS; Manual \$15; state HDOS/ZDOS.

H/Z GRAPHICS on EPSON, Gemini, MT160, NEC-8023, C.Itoh 8510, MPI, Microline w/OKI GRAPH.

(ad printed on C.Itoh 8510)
Specify either HDOS 2.0 or CPM 2.2.03 (specify). Not for Z-100.
0--NOV-- PRINTS Software Toolworks' ED-A-SKETCH FILES!!!!
0Character desinger included - start with the H/Z-19 set and make your own math/Greek/Hindu/Arabic/Zodiac/Blob etc. characters
0All characters accessible from keyboard, text file, or program
0Printer codes same as terminal codes (ESC-F, G, p, q)
0All drivers offer choice of 8 x 12 character set or 6 x 12 to allow 10 cpi exact replica of screen. PRINTS ED-A-SKETCH FILES.
+Req. Serial buffer or parallel interface, bit graphics. \$25.00

CHECK MASTER - Specify HDOS, CPM, or Z-DOS; Hard or Soft Sector.
* Archival file for reference, tax records
* Checkbook, statement balances displayed; Search & Change options
* Statement processing; auto. check clearing, uncleared listings
* Edit transactions on the screen; insert/delete transactions
+ Req. Microsoft BASIC, 48k RAM. \$20.00 postpaid.

OTHER HARDWARE SUPPLIES - DISKS, DRIVES, RIBBONS & CARTRIDGES, ETC
> Ribbon Cartridges - NEC-8023/C.Itoh 8510: \$6.00; Epson MX/FX/RX-80 carts: \$7.35; Epson, MPI, Centronics ribbon ZIP-PAK: \$3.50; NEC 8023, C.Itoh 8510 ZIP-PAK: \$3.50. All prices postpaid.
> TWO Teac 55B (40 track, double sided) fit in one drive space, give high capacity. With case, cable, drives - ALL FOR \$600 ppd.
> HARD OR SOFT SECTOR (specify) DISKETTES - \$20.00 ppd for ten.
> PRINTERS, other DRIVES, RAM IC's - write for FREE CATALOG.

Circle #132 on Reader Service Card

FLOPPY DISK CONTROLLER

Controls Any Combination Of Up To Four
8" and 5 1/4" Drives

This easy to install plug in board can control any combination of single or double sided, single or double density drives.

Designed especially for H88/H89 users.

- Fully compatible Bios supplied for your CP/M 2.2 operating system
- Easy to follow instructions
- Contains controller board with boot prom
- Order cables for connection \$15 (HFDC-110)
- **Introductory Offer \$395,**
Order HFDC-100

**NORTH
COAST
INTELLIGENCE
INC.**

1201 Cherokee Trail
Willoughby, Ohio 44094
Phone: 216-946-7756

Circle #204 on Reader Service Card

VT100 Performance for H19/Z19

The HT100 firmware upgrade to Heath H19/Zenith Z19 permits running of software programs written for DEC's VT100 and VT102 (e.g., DEC's EDT and KED screen editors). This is an inexpensive way of obtaining VT100 performance at about half the cost (H19/Z19 + HT100) of DEC's VT100. The HT100 firmware has been extensively tested on DEC's VAX and PDP-11 computers for several man years. Included: 3 ROMs, Reference Manual/Installation Guide, APL keycap labels (with APL option), EDT Keypad Editing Reference card.

Features of HT100 Upgrade:

- **ANSI and DEC VT100 Escape Sequences**
Hardware limitations: normal and reverse video character attributes only, no programmable tabs, no smooth scroll, and no 132 column display. All DEC escape sequences understood and accepted.
- **VT52 Escape Sequences**
- **VT100 Style Setup Mode**
- **VT100 Graphics Characters**
- **Control Character Display Mode**
- **APL Char Set with Overstrike (\$5 Option)**
- **Thorough and Clear Installation Guide**

Dealer inquiries are welcomed. Large quantity discounts available.

For information or ordering:

MicroFirm, Inc.
Rockefeller Center Station P.O.
P.O. Box 1276
New York, N.Y. 10185

Make check payable to: MicroFirm, Inc.
\$95 for HT100, add \$5 for APL Option
New York State residents add applicable tax

Circle #207 on Reader Service Card

conference was a success, and enjoyed his part in it. He admitted, however, "I don't think I'll be vendor chairman next year. I'd kind of like to enjoy the fruits of my labors."

Will there be other regional conferences?

CHUG has demonstrated that it's possible for a local users' group to put together a good regional users' conference. Now it's up to other HUGs to follow CHUG's lead. Perhaps, by the time you read this, someone will have organized a West Coast HUGCON, or a Florida HUGCON.

Stay tuned to this station for news of CHUGCON 84.

Additional Information

Capital Heath Users' Group
P.O. Box 2653
Fairfax, VA 22031

Heath Users' Group
Hilltop Road
St. Joseph, MI 49085
616/982-3463

Participating Vendors

ACCESS

P.O. Box 1053
Norristown, PA 19404
215/272-4807

ACT Marketing
104 Lakefront Drive
Hunt Valley, MD 21031
301/628-0260

Apogee Software
P.O. Box 15124
Savannah, GA 31416
912/925-3765

Cherry Engineering
P.O. Box 216
Laurel, MD 20707
301/498-4236 (8-10 p.m.)

Cleveland Codonics, Inc.
P.O. Box 45259
Cleveland, OH 44145
216/243-1198

CompuTech
P.O. Box 2027
Poquoson, VA 23662
804/868-8055

Evryware
P.O. Box 5204
Olympia, WA 98503
206/459-2395

Extended Technology Systems
1121 Briarwood
Bensalem, PA 19020
215/752-4604 (evenings)

Floppy Disk Services, Inc.
741 Alexander Road
Princeton, NJ 08540
800/223-0306

GROFFics
Route 4 Box 515
Chapel Hill, NC 27514
919/942-0650

H & H Computer Enterprises
P.O. Drawer H
Blacksburg, VA 24060
703/552-0599

H/C Forum
35 West Wainwright Drive
Poquoson, VA 23662

Heathkit Electronic Center
6201 Richmond Highway
Alexandria, VA 22303
703/765-5515

Hoyle & Hoyle Software
716 South Elam Avenue
Greensboro, NC 27403
919/378-1050

Husker Systems
of Nebraska, Inc.
4517 North 61st Street
Omaha, NE 68104
402/451-4988

Interface Technology
P.O. Box 745
College Park, MD 20740

Linton Printers
4600 Waverly Avenue
Garret Park, MD 20896

Micromation
9104 Red Branch Road
Columbia, MD 21045
301/730-1237

New Generation Systems
2063 Fort Lee Street
Herndon, VA 22071
703/476-9143

New Orleans General
Data Services
7230 Chadbourne Drive
New Orleans, LA 70126
504/241-9495

Newline Software
P.O. Box 402
Littleton, MA 01460
617/486-8535 (evenings)

Northwest Digital Systems
P.O. Box 15288
Seattle, WA 98115
206/362-6937

One Way Micro Systems
P.O. Box 2546
Reston, VA 22090
703/860-3307

Powerline Systems
P.O. Box 97
Lincroft, NJ 07738
201/747-2063

Robins, Inc.
8304 Hilltop Road
Fairfax, VA 22031

Schumacher Associates, Inc.
12619 Valleywood Drive
Woodbridge, VA 22192
703/494-7885

Sextant Publishing Company
716 E Street, S.E.
Washington, DC 20003
202/544-0900

T & E associates, Inc.
P.O. Box 362
Millersville, MD 21108
301/987-4748

Technical Micro Systems, Inc.
P.O. Box 7227, Dept. H
Ann Arbor, MI 48107
313/994-0784

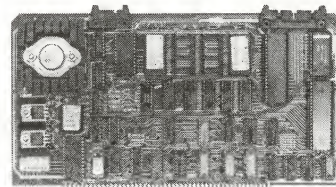
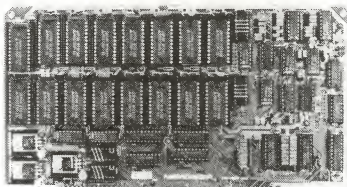
Terminals Unlimited
350 South Washington Street
Falls Church, VA 22046
703/237-8666

Trionyx Electronics, Inc.
P.O. Box 5131
Santa Ana, CA 92704
714/830-2092

Zeducomp
P.O. Box 68
Stirling, NJ 07980
201/755-2262

Z-100 News

S-100 Products for the Heath/Zenith Z-100 Computer!



ADD A VARIETY OF NEW CAPABILITIES AND ENHANCEMENTS TO YOUR SYSTEM —

- Prom Programming
- Speech Synthesis
- More Memory
- More Floppy Disks

And much more . . . ADS' complete line of I.E.E.E. 696/S-100 compatible boards will expand your system capabilities and usefulness. Our boards will let your system talk, run other CPU's operating systems and software! Further, our Octafloppy™ Disk Controller Card will allow you to simultaneously run up to eight disk drives, 5¼" and/or 8"!

Call or write today:



Ackerman Digital Systems, Inc.

216 W. Stone Ct., Suite 208, Elmhurst, IL 60126

Telephone: 312/530-8992

Circle #196 on Reader Service Card

AMERICAN COMPUTER

P.O. BOX 386, HADDONFIELD, NJ 08033

(609) 939-0802

**Z-110-32 Low Profile Z-100 with 11.3 MB hard disk,
320K drive, 192K RAM, color graphics, Z-BASIC ... \$3899.95
LIMITED QUANTITIES**

Z-120-22 All in one with two 320K drives, Z-DOS... \$2699.95
Z-100-21 Low profile Z-100, one 320K drive, Z-DOS... \$2224.95
Epson RX-80 printer, 100 CPS, Graftrax... \$279.95
Blank Disks VERBATIM ELEPHANT WABASH
hard sector 22.95 22.95 27.95
SS/DD soft sector 22.95 22.95 30.95
DS/DD soft sector 39.95 32.95 49.95
Flip 'N' File 5¼" diskette storage case... \$22.95
Software Toolworks Pie and Text word processor... \$59.95
Software Toolworks ZenCalc electronic spreadsheet... \$39.95
Software Toolworks C/80 with Mathpak... \$59.95

*****NEW PRODUCTS*****

StarGemini 10X printer 120 CPS enhanced graphics... \$319.95
DYNAX DX-15 letter quality printer 13 CPS 3K buffer
prints red and black. Serial... \$524.95/parallel... \$499.95
U.S. Robotics Password modem, 300/1200 baud, auto
dial, auto answer, intelligent modem... \$364.95
ZVM-135 high resolution color monitor... \$499.95

American Computer is an authorized dealer for
Okidata printers. Call for our low prices.
Send for free catalog. Out of USA \$2.00 for postage.
Office: 448 Roosevelt Ave., Glendora, NJ 08029

Phone orders Tues., Thur. 10 AM to 12 PM, Sat. 10 AM to 5 PM EST
Electronic Bulletin Board available on weekends



**data
systems**

Authorized Sales and Service Center



VISA and MASTERCARD

add 3%

USE ALL YOUR SPECIAL FUNCTION KEYS

With WORDSTAR™

WSKEY™: Now you can take the mystery out of WordStar with SKILL DATA's WordStar enhancement, which implements all twenty-one of the H/Z89-19 function/pad keys or all twenty-three Z-100 labeled key commands.

Function key commands are labeled by a twenty-fifth line banner, which can be toggled on and off by you during your session.

With dBASE II™, ZIP™, SuperCalc™

DBKEY™, ZPKEY™, and SCKEY™: Just type your favorite SKILL DATA key command. All function key commands are labeled by a twenty-fifth line banner, which can be toggled on and off by you during your session. Pad keys also function and send multiple key inputs with a single stroke. All previous command key sequences are still available for the old and painful ways. (See the review of DBKEY and ZPKEY in September 1983 dNEWS.)

Just \$29.95 for each program (plus shipping charges shown below).
H/Z89-19 diskettes are 5.25" 10HS, require CP/M 2.2.03.
Z-100 diskettes are 5.25" SS; specify CP/M-85 or Z-DOS.

**Complete and mail this order form with your check or money
order today!**
Mail to SKILL DATA, P.O. Box 1943, Olympia, WA 98507.

Yes, I want to use all my special function keys! Send me:

☐ WSKEY—keys to WordStar: ☐ for H/Z89-19 ☐ for Z-100 \$29.95
☐ SCKEY—keys to SuperCalc (for CP/M only) \$29.95
☐ DBKEY and ZPKEY—keys to dBASE II: ☐ for H/Z89 ☐ for Z-100 \$29.95
For Z-100 diskettes, specify operating system: ☐ CP/M-85 ☐ Z-DOS

Name _____

Street _____

City _____ State _____

Zip _____ Phone _____

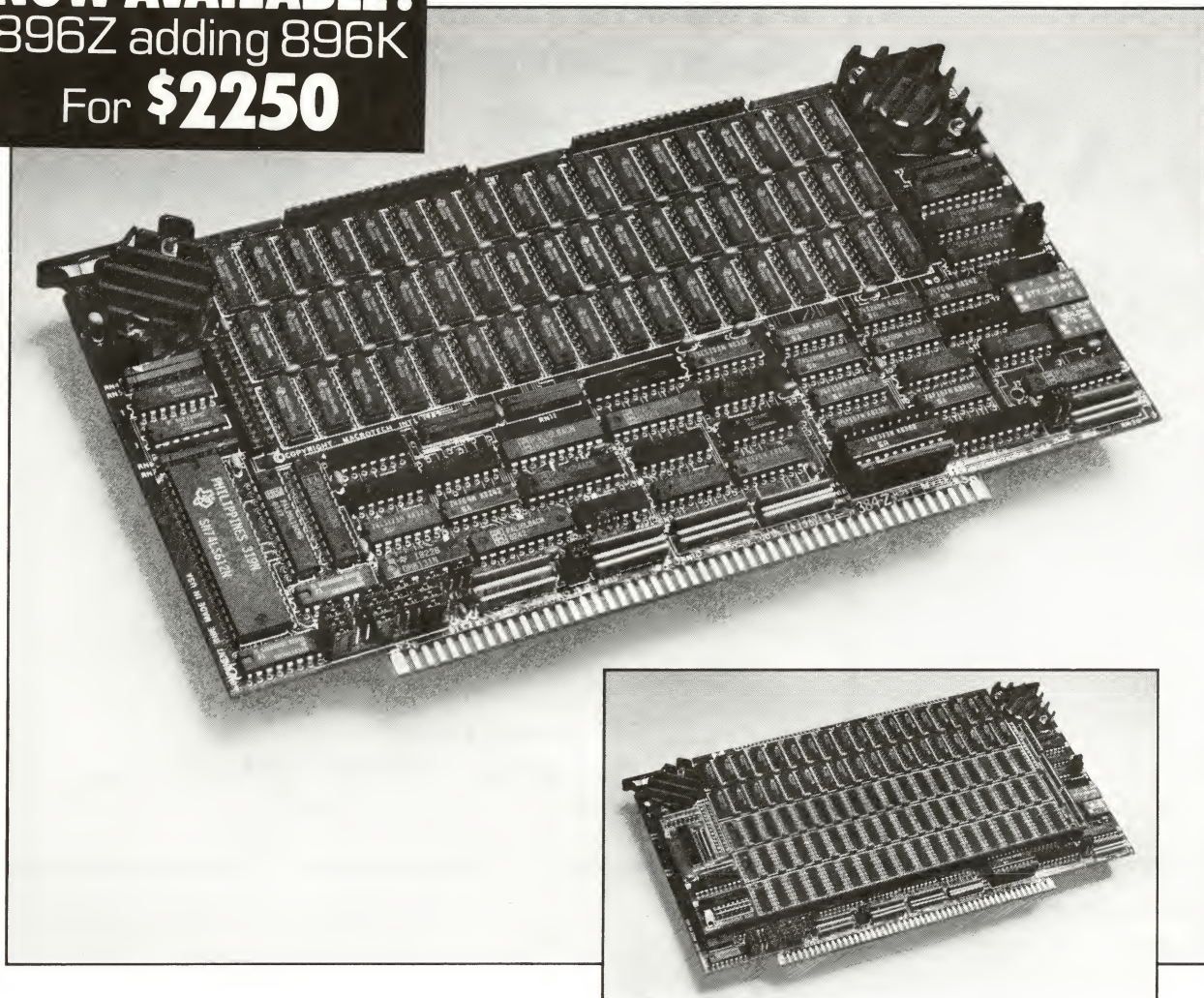
Visa/MC Card # _____ Expires _____

All orders shipped by first class mail. Include \$3.00 per order for shipping and handling, \$5.00 for overseas orders. Payment by check, money order, or Visa/MasterCard. Allow 2-4 weeks for delivery. 206/352-0669 (evenings).

SKILL DATA, P.O. Box 1943, Olympia, WA 98507

Circle #188 on Reader Service Card

NOW AVAILABLE!
896Z adding 896K
For **\$2250**



SUPERCHARGE YOUR Z-100 SYSTEM

Macrotech announces two new memory products for Zenith Z-100 computers. Designed specifically for Z-100 systems, our 640Z or 384Z upgrades your main memory to a full 768 or 512 kilobytes.

- Requires use of only one expansion slot.
- Full byte parity. (Standard on all Macrotech dynamic memory products.)
- Includes unique, lightning-fast "Macrocache"™ pseudo-disk operating software enabling dynamic memory allocation between full cache mode and "virtual disk" mode. Runs under Z-DOS* or CP/M 86.
- Comprehensive technical manual included.
- Full one year warranty.

PRICES:

384Z—Adds 384K high speed (150 ns) dynamic RAM
\$1,375.00

640Z—Adds 640K high speed (150 ns) dynamic RAM
\$1,975.00

Macrotech also offers ADIT, the only full-featured intelligent I/O expansion module for S-100. Utilizing full DMA, the ADIT provides up to 16 full duplex RS 232/RS 422 channels from one expansion slot.

For more information about the Z-Series of Z-100 memory products, or the ADIT intelligent I/O board, contact your local Zenith dealer or Macrotech International Corp.

* Z-DOS is a registered trademark of Zenith Data Systems.
CP/M is a registered trademark of Digital Research.

MACROTECH INTERNATIONAL CORP.

9551 Irondale Ave., Chatsworth, CA 91311, (818) 700-1501



Why Won't All That IBM-PC Software Run on My Z100?

The operating system ought to be the bridge between the application program and the computer. Too many programmers use the PC's ROM as a shortcut.

Graham Wideman

People deciding which computer to buy will probably weigh heavily the amount of software available to run on each machine. Those considering the H/Z100 may well be encouraged by the fact that it appears to have many points of compatibility with the IBM Personal Computer. Both the Zenith Disk Operating System (Z-DOS) and the PC Disk Operating System (PC-DOS) are variants of the Microsoft Disk Operating System (MS-DOS). The standard presumption most of us make is that programs written for a given operating system should run on any computer that runs the operating system. From this, many will conclude that the huge PC-DOS software base may be tapped by the H/Z100.

From a hardware perspective, moreover, the H/Z100 appears to have been designed with compatibility considerations in mind. It has not one but two central processor unit (CPU) chips. Its 8-bit Intel 8085 processor allows it to run software written for the CP/M operating system. Its other processor is the 8088, the same one as the PC's.

Users who already own an H/Z100 may also find compatibility an important subject. Some have attempted to run some PC software. More often than not, however, they have encountered the infamous WILD INTERRUPT message, and failure of the program.

The lure of that PC-DOS software pool is not going to go away. Nor, I am afraid, are at least some of the obstacles that stand between the software and the average H/Z100 user. Some of the problems, however, can be overcome. When they are, a number of popular PC programs become usable on the H/Z100.

In this article, I'd like to examine the reasons behind the problems. In doing so, I'll describe a software package that we (Wideman Computer Consulting) have produced to emulate some of the functions of the PC. Called IBEm, it combats several of the PC-compatibility problems. Other problems remain. The

problem of compatibility, however, has always faced computer users. It's not insurmountable. I hope this article encourages some of you to work on it.

Similarities and differences

There are two main areas of compatibility between the PC and the H/Z100. First, as noted above, the disk operating system is the same. Moreover, the disk formats are the same; so each machine

A large proportion of "runs under PC-DOS" software actually circumvents the operating system.

can read the other's disks. And thereby, programs and data can be readily transferred from one machine to the other.

This *should* tell all. To the computer purist, the function of an operating system is to ensure that applications programs have a standard interface to the particular computer on which they are running. Thus, we would reason that any differences between the PC and H/Z100 hardware are taken care of by MS-DOS.

The application-program interface provided by MS-DOS on each machine is indeed the same. However, the catch is that a large proportion of "runs under PC-DOS" software actually circumvents the operating system and accesses features of the PC by other routes, routes which are unique to the PC. (Different routes are used to accomplish the same goals on the H/Z100.)

So our next step is to examine the PC's "other routes."

How a PC programmer programs

To aid in this discussion, Figure 1 provides a picture of the conceptual layout of software and hardware in the

PC. The arrows show the "proper" ways in which the various hardware features of the PC may be accessed—in other words, through PC-DOS. In order for an applications program to access the keyboard, it calls the operating system; the operating system finds out which key was struck and passes it back to the applications program.

For those readers interested in the actual MS-DOS "calling mechanism," it is implemented via "software interrupts" of the PC's 8088 central processor unit. Such an interrupt is an assembly-language instruction, INT xx.

A software interrupt is simply a glorified subroutine call, with one important difference: the address of the subroutine is specified in a four-byte vector in a fixed location in lower memory. This location is determined by the number xx of the interrupt (zero to 255).

As an example, most MS-DOS functions are accessed via INT 21H (hexadecimal), whose vector is at 84H. (For CP/M users, this is analogous to your CALL 5.) This procedure is used so that the applications program doesn't need to know where a routine is in memory, just which one it wants. MS-DOS fills in the actual addresses in the interrupt's vectors.

As I mentioned, PC-DOS isn't the only way to access PC hardware. But why go any other way? The answer to this key question is simple. In a number of cases, PC-DOS actually stifles much of the capability of the PC's hardware. A prime example is the lack of flexible video output available through PC-DOS. It is possible to send ordinary characters to PC-DOS and have them print on the screen. However, there is no way to perform often-needed terminal functions, such as moving the cursor, deleting to the end of the line, and so on. That means that a word processor can't do fancy video maneuvers through PC-DOS.

(I might note in passing that the H/Z100 is able to perform such func-

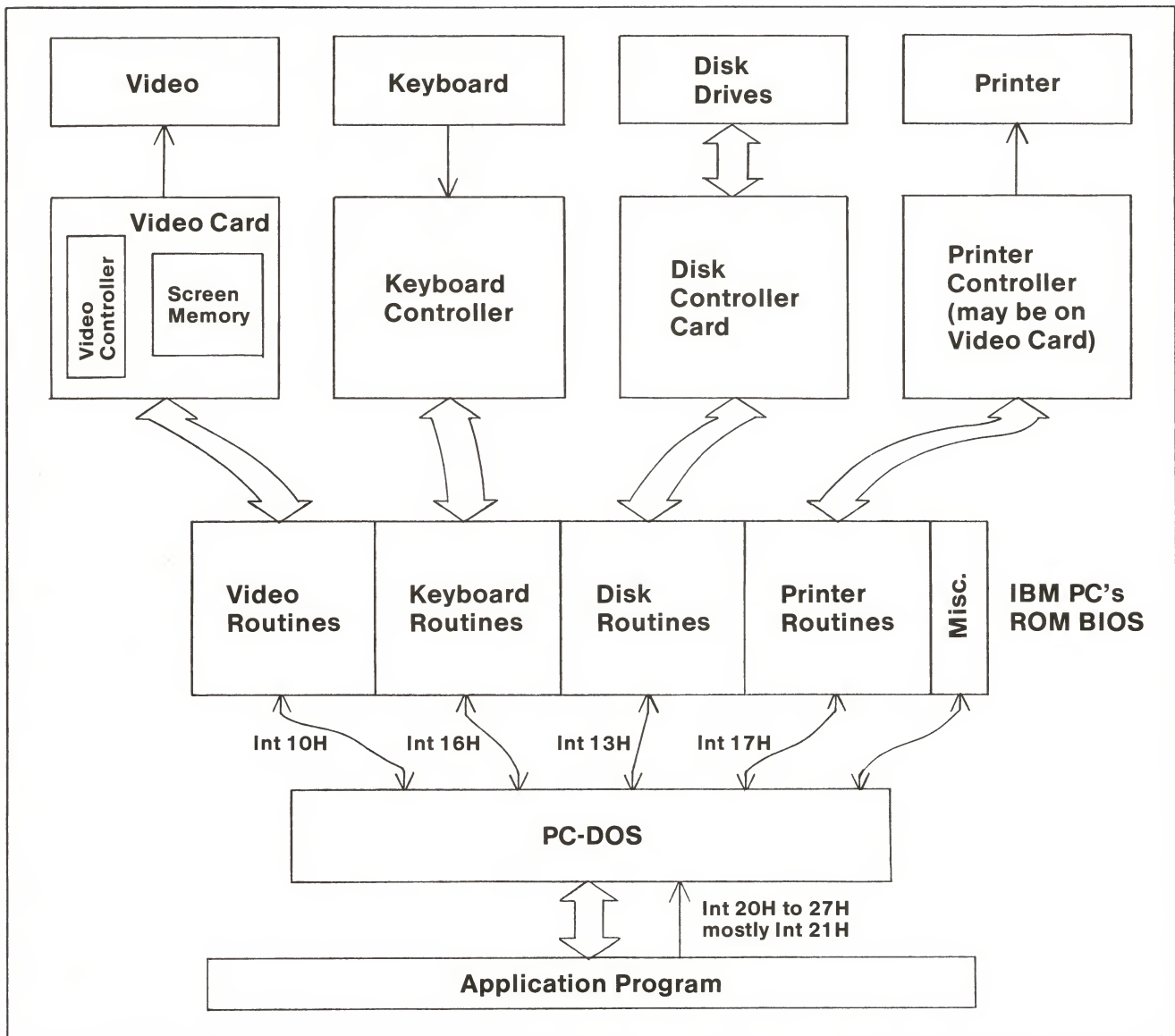


Figure 1: How an application program interacts with the IBM PC. What is *not* shown here is that many programs bypass PC-DOS and use the ROM directly; and other programs may write to and read from the video memory directly.

tions through Z-DOS, because the Z100's screen-handling software is set up to emulate the older H/Z19 terminal. These functions are performed by using ESCAPE sequences.)

Fortunately (or unfortunately, from an H/Z100 user's point-of-view), there are other easy ways to access the PC's hardware. These are mostly through the PC's read only memory (ROM) and the ROM's extensive basic input/output system (BIOS)—"basic" meaning rudimentary.

The PC's ROM "operating system"

The PC has a large ROM. It's large enough so that it even includes BASIC. And it contains extensive routines for accessing and controlling almost every feature of PC hardware; including disks, video screen, keyboard, printer, and cassettes.

In fact, I suspect that it was the decision that the PC be able to work with cassette which obliged IBM to put

such an extensive BIOS into a ROM in the first place. (The usual procedure is to have much less in ROM, since changing the chip is cumbersome and expensive if revisions need to be made later.) The routines the PC has in ROM would normally be loaded from disk. Such a procedure would be impossibly slow if cassettes were the system's mass-storage device.

The PC's ROM routines are also accessed via software interrupts—interrupts having numbers which do not conflict with PC-DOS's, of course. In fact, PC-DOS uses many of these ROM routines itself. This situation is also shown in Figure 1.

So, as I mentioned, PC-DOS doesn't provide PC programmers with everything they need. Therefore, in order to write a sophisticated-looking package which can take full advantage of the PC's capabilities, many PC programmers have been obliged to use the ROM-BIOS routines directly.

And every time this happens in a PC program you are running on your H/Z100, you get a WILD INTERRUPT message.

So now we need a more detailed discussion of exactly which routines are probably causing that message.

Popular "PC misbehavior"

What follows, then, is a list of the PC-features which we found are often accessed through the ROM. It also gives details showing how attractive the ROM routines are relative to using PC-DOS—which should, in turn, indicate how frequently these are used by programmers. (I will also include comments on the H/Z100 emulation of each of these functions provided by our package IBE, version 1.2.)

Video: This is interrupt 10H. The PC's ROM provides extensive routines for handling text on the screen, and for handling graphics. As noted, PC-DOS provides only simple, teletypewriter-

Graphics for any EPSON Printer!



MXGRAPH

* **MXGRAPH** will turn your EPSON printer into a graphics plotter for personal or business needs! Make your EPSON plot an unlimited number of artistic sketches, geometric designs, and business graphs, which would not be possible without MXGRAPH.

MXGRAPH runs under CP/M-80 or HDOS operating systems ONLY on the H/Z-89 and H/Z-90 computer systems. Requires an EPSON printer equipped with bit plot capabilities. Specify HDOS or CP/M, hard or soft sector 5.25" disk. **MXGRAPH** is ONLY \$79.95 \$49.97!

NOVA

* **NOVA The WordStar™ Enhancer!** Adds full use of ALL your keypad AND special function keys to WordStar. Greatly increases speed and ease of editing text. 25th line prompts you. **NOVA** REQUIRES HEATH/ZENITH DISTRIBUTED WORDSTAR. **NOVA** REQUIRES Heath/Zenith distributed CP/M-80 (Version 2.2.03 or later) for operation on an H-8, H/Z-89, or H/Z-90; or CP/M-85 for operation on an H/Z-100. Specify hard or soft sector 5.25" disk. **NOVA** is ONLY \$39.95 \$24.97

* DON'T DELAY - ORDER NOW! *

EFC

* **EFC - The Electronic Filing Cabinet** is a screen-oriented hierarchical database. Use EFC as a **PERSONAL FILING SYSTEM** for all types of information!! Runs under Z-DOS ONLY on the H/Z-100 (also with optional Z-29 alternate terminal). **EFC** is \$39.97!

MXPRINT

* **MXPRINT** generates almost **LETTER-QUALITY** printing on an EPSON printer equipped with bit plot capabilities! Prints 10 char per inch by 6 lines per inch (9x24 matrix). Includes MXFONT for generating your own font. **MXPRINT** REQUIRES Heath/Zenith distributed CP/M-80 (Version 2.2.03 or later) for operation on an H-8, H/Z-89, or H/Z-90; or CP/M-85 for operation on an H/Z-100. Specify hard or soft sector 5.25" disk. **MXPRINT** is \$19.97!

GRAPHICS

* **GRAPHICS - Resident interlaced graphics subroutines** is a set of graphics subroutines for the interlaced mode for interface to all MicroSoft compilers, assemblers and the Z-BASIC interpreter. Runs under Z-DOS ONLY on the H/Z-100. **GRAPHICS** is \$39.97!

LETTERIT

* **LETTERIT** generates poster quality lettering on any DIABLO printer! Prints proportional about 3 char per inch by 2 lines per inch (Nx24 matrix). Includes DBFONT for generating your own lettering. **LETTERIT** REQUIRES Heath/Zenith distributed CP/M-80 (Version 2.2.03 or later) for operation on an H-8, H/Z-89, or H/Z-90; or CP/M-85 for operation on an H/Z-100. Specify hard or soft sector 5.25" disk. **LETTERIT** is \$19.97!

MICRO INNOVATIONS

2455 Sylvania Avenue
Toledo, Ohio 43613

VISA and MASTERCARD Orders Welcome!

CALL NOW: (419) 471-1245

Circle #137 on Reader Service Card

CP/M* FILE TRANSFER UTILITY - \$25

Transfer disk files between systems with incompatible media formats. Transfer is via serial ports (requires RS-232 cable, not supplied). Software supplied on both hard and soft-sectored 5.25" CP/M diskettes for use on H/Z-100, H/Z-89, and H-8 systems.

H-17* DISK SUPPORT SYSTEM - \$65

A complete CP/M* disk diagnostic and data recovery system for H-17 hard-sectored disk drives

- | | |
|----------------------|---------------------|
| • file unerase | • disk verification |
| • bad sector lockout | • sector editor |
| • soft error report | • copy bad files |
| • disk error map | • test disk status |
| • measure disk speed | • test disk control |
| • measure head seek | • and others |

Terms: check, money order, or Mastercard/Visa
Price includes shipping



Place order or request
information from:

THE SOFT FIRM

P.O.Box 1125 Picayune, Ms. 39466

* CP/M tm DRI - H8,H/Z89,H/Z100 tm Heath/Zenith

Circle #219 on Reader Service Card

IS YOUR CHECKBOOK A BALANCING ACT?

CHECK PROCESSOR is an easy to learn, easy to use program for balancing your checkbook, savings, and charge card accounts. **CHECK PROCESSOR** also maintains a record of your accounts, and records up to 31 categories of account transactions for tax deduction or accounting purposes. **CHECK PROCESSOR** is designed for easy entry and modification of transaction data, much like a screen oriented text editor. On-screen automatic recalculation provides you with instantaneous balance totals with each deposit/withdrawal or debit/credit. Included with **CHECK PROCESSOR** is **CHECK LIST**. **CHECK LIST** will print various reports including Reconciled Checks, Current Checks, and Individual Check Categories. Allows multiple files for different accounts.

ONLY \$29.95!

CP/M version for H89, H8/H19
ZDOS version for Z-100

NEWLINE SOFTWARE

P.O. Box 402, Littleton, MA 01460 (617) 486-8535

NAME _____	CHECK ONE
STREET _____	<input type="checkbox"/> H89, H8/H19,
CITY _____	CP/M
STATE _____ ZIP _____	<input type="checkbox"/> Z-100, ZDOS
Send me _____ CHECK PROCESSOR program(s) at \$29.95 each.	
Check one: <input type="checkbox"/> payment enclosed <input type="checkbox"/> send COD (add \$3.00)	
Send order to:	
NEWLINE SOFTWARE, P.O. BOX 402, LITTLETON, MA 01460	
Foreign orders: add \$3.00 Airmail, \$10.00 for non-U.S. checks	

CP/M is a trademark of Digital Research, Inc.
ZDOS, Z-100 are trademarks of Zenith Data Systems, Inc.

Circle #145 on Reader Service Card

like output to the screen. (So there is no direct cursor positioning, nor many other functions needed by word-processors.) Consequently, PC-DOS is almost never used in this regard by software attempting any sophistication.

The ROM provides fairly complete text handling, including positioning on the screen's X and Y axes and window scrolling. Routines are included for both of PC's video boards (monochrome and color-graphics boards) and several different display formats.

However, the ROM's graphics routines are not, in our opinion, complete enough to be useful by themselves. So our IBEEm package instead provides routines to emulate operation with the PC's 80 x 25 monochrome text-only board.

We decided not to support the ROM's graphics and color, since the PC's screen format is inherently different from the H/Z100's, and the graphics routines are almost always circum-

vented by programmers. Not supporting color is not often a problem, because most software will adapt to run with either of the PC's video cards, and IBEEm tells the software that a monochrome card is installed.

Although IBEEm will not permit the running of programs which perform

They should be asking, "How compatible is it?" rather than just, "Is it compatible?"

pixel-graphics functions, version 1.3 of IBEEm *does* provide the PC's graphics characters. These prove to be quite useful in cases where software menus use a picture, such as an arrow character, to illustrate the keys.

I must note here that the data to be displayed on the PC's screen gets stored in memory within the PC's address space. Therefore, the PC programmer has the alternative of accessing the PC's video cards directly. This is almost universally done for pixel graphics. It is also done sometimes for text, when the programmer needs extra speed.

It is important to realize that this direct access to the display memory cannot be emulated in software on the H/Z100. So neither IBEEm nor any other emulator package can cope with such programs. More on this subject later.

Another consideration which is sometimes inconvenient is the speed of programs operating under IBEEm. While a particular PC-DOS program may operate, its video operations will always be slower than on a PC.

The reason for this is that in certain respects the PC's text handling is optimized in terms of how much time is consumed in putting a character on the screen. As a result, programmers have sometimes taken liberties with this speed: they have crammed more screen manipulation into their PC software than they would normally attempt on other machines, particularly terminal-based ones. When IBEEm intercepts these commands, it then has to perform them on the somewhat less-optimized-for-text H/Z100.

Keyboard: Using the PC ROM's Interrupt 16H, the PC programmer can get full information on all the PC's keys, including the function and cursor keys, and the complete extra "case." (The PC has uppercase, lowercase, control characters, and an "alternate" case.) Although all the keys are reported via PC-DOS, the special keys (anything non-ASCII) are passed back in a rather inconvenient form (a "0" followed by the key code). Programmers have tended to prefer the one-call-gets-it-all routine found in ROM. (We implemented the ROM's INT 16H in IBEEm so that we could emulate all of these keys on the H/Z100 keyboard.)

Printer: Although it is quite possible to access the printer through PC-DOS, some programs use INT 17H of the ROM for this function, notably at least some versions of MicroPro's WordStar. (This function is implemented in IBEEm.)

Equipment report: Interrupt 11H on the PC is a function which returns information as to the amount of memory on the main board, number of disk drives, printer, video card, etc. (This is implemented in IBEEm.)

Memory check: Interrupt 12H reports back the amount of memory available. (Implemented by IBEEm.)

Disk access: Surely the main function of a disk operating system is to control the disks? So no one is going to circumvent PC-DOS on this matter, right?

Well, unfortunately, they do. Given fairly simple commands, the ROMs pro-

PRE-PUBLICATION OFFER

Now find software, hardware, and peripherals to work with your Heath/Zenith computer in one convenient source . . .

The 1984 Buss Directory . . .

your most complete guide to the independent suppliers who support Heath/Zenith systems.

More independent suppliers are supporting Heath/Zenith systems than ever before—

with new software to run on the H/Z100 . . . new hardware enhancements . . . continued support for the still-popular H/Z89 and H8 . . . peripheral products, publications, services, and discount supplies. . .

You can find the products you need to complete your computer system in *The 1984 Buss Directory*.

Here's what you'll get—

- information about over 250 companies and individuals with products that work with Heath/Zenith computers
- a source of extensive support for your computer, whether you use an H/Z100, H/Z89, H88, Z90, or H8
- listings arranged alphabetically by supplier name, with address, telephone number, contact name, complete product descriptions, and pricing information
- references in each product listing to back issues of *Buss: The Independent Newsletter of Heath Co. Computers* in which the products are further described, reviewed, or discussed—letting you find more information about products before you buy them
- an extensive index to help you find the products you're looking for
- as an added bonus—a directory of local Heath Users' Groups throughout the country

The Buss Directory is revised annually. Keep *The 1984 Buss Directory* near your computer as a valuable reference guide to use throughout the coming year.

Get your copy of *The 1984 Buss Directory* at 24% off the cover price—or get it FREE when you subscribe to *Buss* newsletter!

☐ Send me _____ copies of *The 1984 Buss Directory* at the pre-publication price of \$9.50. After May 31, the price is \$12.50.

If I'm not completely satisfied, I'll return the directory within 30 days for a full refund.

☐ Start my subscription to *Buss* newsletter. I'll get the directory free with my subscription. I enclose \$28 for 20 issues of *Buss* (US\$40 overseas).

*If I'm not satisfied with *Buss* at any time during my subscription, I'll receive a full refund and keep the directory.*

Name _____

Address _____

☐ Payment is enclosed

☐ Charge my ☐ VISA ☐ MasterCard

Card # _____

Expires _____

The 1984 Buss Directory will be published in June 1984. The pre-publication offer of \$9.50/copy expires May 31. Beginning June 1, copies of the directory will sell for \$12.50 each.

Subscribers to *Buss: The Independent Newsletter of Heath Co. Computers* will receive the directory free, as a part of their subscription. To order *Buss*—eight pages of valuable information sent to you 20 times a year—send \$28 for 20 issues (\$40 for airmail overseas).

Fill out the coupon provided here and mail it today with your payment. Checks (in U.S. dollars payable on a U.S. bank), money orders, VISA, and MasterCard are acceptable.

Send orders to: *The 1984 Buss Directory*, 716 E Street S.E., Washington, DC 20003 (202/544-0900).

DON'T PANIC

PROTECT YOURSELF FROM DATA LOSS FOREVER with RESCUE & REPAIR

Did you press the wrong key... accidentally hit "Reset"... "quit" without saving to disk... find your "disk full"... or have your computer "lock up?" Hours of "lost" work can be saved with **RESCUE & REPAIR**.

- **RESCUE** will get it from memory and put it on disk with a one line command.

- **REPAIR** will restore the file in a few minutes using simple but powerful editorial commands.

If you program, word process, or do extended data entry, you need **RESCUE & REPAIR**. It will pay for itself the first time you use it.

Available for most computers using CP/M 2.2

21st CENTURY DATA, INC., P.O. Box 1139 • Dept. A2 • Solana Beach, CA 92075 • (619) 755-6218

TO ORDER: **RESCUE & REPAIR** disk† and manual \$45.00

† Specify computer, make, model and drive type

Shipping postpaid in the U.S., Canada and Mexico. Other countries please add \$5.00 per disk for shipping. California residents add 6% sales tax.

CP/M is a registered trademark of Digital Research.

Circle #233 on Reader Service Card

The Software Toolworks® **MyCalc**
presents:

THIS IS MYCALC™ FREDDIE. IT'S A SPREADSHEET. AND FOR SIXTY BUCKS IT'LL SOLVE YOUR PROBLEMS.

COMES WITH TEMPLATES FOR IRS FORMS 1040 & SCH.A

MYCALC™ IS \$59.95. IT'S AVAILABLE FOR CP/M® AT MOST HEATH/ZENITH DEALERS. WRITE OR CALL FOR A FREE 41 PRODUCT CATALOG AND NEAREST DEALER.

A SOFT BUY IN A HARD WORLD!

*UPDATED VERSION OF ZENCALC

Full featured MyCalc™ with sort, bar graphs, multiple files and more is ideal for financial planning and budgets. It sells for \$59.95 from The Software Toolworks, 15233 Ventura Blvd., Suite 1118, Sherman Oaks, CA 91403 (818) 986-4885.

CP/M is a registered trademark of Digital Research.

Circle #165 on Reader Service Card

LEARN TO PROGRAM H89/H19 GRAPHICS IN MBASIC

BASIC GRAPHICS PRIMER is a computer based course that will teach you fundamental MBASIC programming techniques to control the H19 terminal or H89 computer graphics. Seven lessons will teach you many forms of graphic plots, data plotting, multiple sequential and random access files used for graphics, basic figure animation techniques, and simple computer graphics game design. Each lesson consists of simple illustrative program segments with complete explanations of the programming techniques involved, questions to reinforce the lesson material, and one or more example programs. Most H19/H89 terminal commands are covered in the lessons, including use of the special function keys. **BASIC GRAPHICS PRIMER** is a "HOW TO" course with plenty of examples. If you want to learn how to take full advantage of the H19/H89 graphics features in your programs, **BASIC GRAPHICS PRIMER** is a must. For CP/M only. Requires a printer.

ONLY \$49.95!

CP/M version for H89, H8, H19 requires CP/M and MBASIC

Newline Software

P.O. Box 402, Littleton, MA 01460 (617) 486-8535

NAME _____	Send me _____ BASIC
STREET _____	GRAPHICS PRIMER
CITY _____	program(s) for CP/M
STATE _____ ZIP _____	at \$49.95 each.
Check one: <input type="checkbox"/> payment enclosed <input type="checkbox"/> send COD (add \$3.00)	
Send order to:	
NEWLINE SOFTWARE, P.O. BOX 402, LITTLETON, MA 01460	
Foreign orders: add \$3.00 Airmail, \$10.00 for non-U.S. checks	

CP/M is a trademark of Digital Research, Inc.
MBASIC is a trademark of Microsoft, Inc.

Circle #145 on Reader Service Card

Some words on IBE

As I have noted in this article, IBE provides an emulation of many PC features on the H/Z100. Notable programs which this allows running are PC versions of dBASE II (version 2.3, which we use for our invoicing), WordStar (3.24), Perfect Writer (and Perfect Speller, version 1.0), and many less well known programs.

On the other hand, there are many programs which still will not run. The PC version of Lotus 1-2-3 uses direct screen access, while PC-VisiCalc has a simply unbelievable copy-protection scheme. (It actually deactivates any debugger which might be used to trace the cause of the problem!)

Unfortunately, we cannot even come up with a list of what runs or doesn't run, because programs change from version to version. This is exemplified by WordStar's version 3.3—in which the programmers have gone to direct access of the video

board, no longer using the ROM routines. In any case, most of the big-name packages will become available for Z-DOS. Users will be trying to use a package like IBE with the less well known ones (and with those expensive ones "borrowed" from friends with PCs).

We feel that although IBE is not a panacea, it takes the H/Z100 a long way (as far as software can) in giving PC-DOS software a chance to run. If you are considering purchasing a copy, we suggest you try it first, if possible, at your local Heathkit Electronic Center.

The IBE package includes manual, documented source code, and related utilities. Updates may be obtained by returning the original disk with a self-addressed, stamped return envelope. Heathkit Electronic Centers have been provided with evaluation copies; and some of the stores have it available for purchase.

vides rather powerful control over the disks, including reading from or writing to specific sectors. This allows programmers to copy-protect their software; here's one way they might do so.

You can write a small program which can be run just like any other, and show up in the directory with the name of your "real" program. This, however, will only be a "loader" program. You will put the real program directly onto the disk without including any directory entry for it. The loader program will know where to look for it. The loader will bring in the valuable real program from tracks near the center of the diskette, using the ROM's direct track-sector read functions.

So your valuable program is on the disk in an area which the operating system regards as empty. Then you record some bad sectors on a track just outside your valuable program.

What does this all do? Try to copy it. The file-by-file copy program (COPY) will copy only programs which are in the directory. The track-by-track copier (COPYDISK) will get stuck at the bad track. Valuable program protected! Now, this is only a rather simple-minded scheme, and not terribly difficult to circumvent with ingenuity, but it is often used. Unfortunately, this scheme precludes use of the software on the H/Z100 since the PC ROM's disk routines are not available.

For this reason, IBE implements the most-needed track-sector read and write routines. These routines are also used by software which wants to use the disk without the DOS directory, or needs to go directly to specific locations for other reasons. As one result, we were

most delighted to be able to use Peter Norton's PC disk utilities on the H/Z100. (These utilities allow viewing and patching disk areas, and recovering erased or damaged files. But see more on this below.)

It should be noted, however, that IBE's disk routines cannot cope with non-standard sector sizes and numbering. This is because it is necessary for IBE to work through Z-DOS's disk functions, in order that Z-DOS shall always know what is going on. Consequently, more sophisticated copy-protection schemes preclude use of the software on the H/Z100.

BASIC and miscellaneous routines

IBE does not deal with compatibility between the PC's BASIC and the H/Z100's Z-BASIC. BASIC programs initially appear not to be compatible when transferred from the PC to the H/Z100 and vice versa. However, this is just because the two BASICs "tokenize" (convert keywords to single-byte codes) differently. This can be circumvented by saving the program on the source computer with the ASCII option set. (See the BASIC manual on this.) This saves the program as text, which the other BASIC will swallow properly. There may still be problems if a program uses commands not available (or having different syntax) on the other BASIC. Some graphics commands will fall into this category.

There are two ROM routines we have not implemented on IBE. These are the timer routine and the RS232 serial-port handler. The first we omitted because we haven't seen any software which uses it. (This is probably because

PC-DOS has its own time call.) The RS232 function definitely is used, typically by "Terminal" packages. We may implement it in the future; but we have not yet turned up a package for test purposes which uses that function and does *not* do direct video. Suggestions from readers who come across such a terminal package will be welcomed. (When used under IBE, it would currently get an "Unimplemented Interrupt 14H" message.)

How compatible can the H/Z100 be?

A package like IBE allows the use of many more PC-DOS packages than the bare H/Z100 can run. However, there still remain serious obstacles to complete no-worry PC compatibility.

The major obstacle is graphics, and direct access to the PC's video memory for either graphics or text. In our opinion, there is only one real solution to this problem; and that is actually to make an S-100 board which, to software, looks like one of the PC's video boards. (It turns out that this would not conflict with the H/Z100's memory or port usage.)

If that were done, then it would be necessary to write routines (analogous to IBE) which operate that screen memory board *instead* of the H/Z100's screen. This is not trivial, since a PC-DOS program might put things on the screen alternately through PC-DOS, the ROM, and by direct access. So both the ROM interrupts and Z-DOS would have to be implemented for this new video board.

We have performed some experimentation in this area. Our method was to place an ordinary S-100 memory board at the address of the PC video card. Then we wrote a routine that transferred the entire screenful of characters to the H/Z100's video memory. The routine does this each time the applications program receives a key from the console. (This strategy is used because programs get keys after they have finished doing things on the screen.)

Using this technique, we were able to run as an example the Norton Disk Utilities previously mentioned. However, this is *only* an experimental solution, since it works only if direct access is the only method the applications program uses to write on the screen. Additionally, copying the screen for every keystroke makes the keyboard response impractically slow. That is something you can live with in Norton's utilities, since you are usually making single-key selections from menus. It would be useless for word processors. (These experimental routines are provided with the IBE package.)

Our next step is to investigate the practicality and usefulness of such an

WORDSTAR KEYS AND PRINTER SOURCE

For CP/M-80, CP/M-85, ZDOS. Customize Micropro's Wordstar versions 2.26-3.21 to your H19/29 or Z100 keypad and popular printers. SOURCE \$9.95.

TRANSFER MICROSOFT-DOS FILES TO CP/M

RDZ.COM runs under CP/M-80 or CP/M-85 to copy ZDOS or IBM PC-DOS data to your H89 or Z100. Tag and transfer. No file names to type! \$29.95

HIGH-SPEED PORTABLE C LANGUAGE LIBRARY

In excess of 120 modules in CLIB.REL, plus five disks of SOURCE CODE in assembler and C. Features like 255 files, dynamic buffer sizes, all K & R functions. Printed & bound manual, Archiver, portable source generator. Requires The Software Toolwork's C/80 compiler and Microsoft's M80/L80. Complete package \$45.95. Without sources \$21.95.

NEW - Marshall Williams' 4mhz kit, Clem Peppers' Games, George Baer's Fastburner, HDOS support, CPM-80 & CPM-68K utilities, special ZDOS and MSDOS products, and more at truly affordable prices.

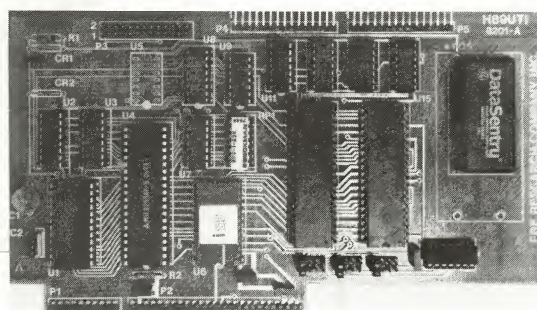


VIKING SOFTWARE

2243 South Belaire Drive
Salt Lake City, UT 84109
(801) 484-9573 after 5

Write or call for free catalog.
MasterCard/Visa
48 hour shipment

from FBE-H89UTI



H89UTI—Utility Board for '89 includes Calendar/Clock with Programmable Interrupts and choice of three types of Backup Battery, Am 9511A High Speed Math Processor, Bi-Directional Parallel Interface, and two standard RS-232 Serial Ports. Replaces '89 Serial I/O card. Many configurations available. Printer Support Package options allow use of parallel port with Epson MX-80, MX-100 and other popular printers.

H89CTI—Simple, 8-Bit Parallel Printer interface for H/Z89. Includes six foot printer cable. Installs on Right or Left side '89 bus. For Epson, Centronics, Okidata, etc.

H8CTI—Similar to H89CTI but for the H8 Computer. Uses I/O Port Address 2. Includes six foot printer cable.

H89RAM—A 16K Memory Expansion for H/Z89A. Price: \$64.95 Assembled and Tested. Low cost is result of unique design. Spare memory chip included.

EPL0T—Multitrac Strip Chart plot utility for HDOS and CP/M. Requires Epson Graftrax MX-100 or MX-80. \$14.95

HDOS Screen Dump Drivers—Dump the '89 Screen on an Epson Graftrax MX-80 or MX-100 printer 3 different ways. \$14.95

PRINTER DRIVERS—HDOS and CP/M support for FBE Parallel Printer Interfaces is available for MX-80, MX-100, and other popular printers. Also, PERCOM ZFD. Source code included.

For More Information, Write or Call. We also sell printers! Ask for our prices on Epson, Okidata, and others.
206-246-9815 (evenings)

FBE Research Company Incorporated
P.O. Box 68234, Seattle, WA 98168

CP/M is a trademark of Digital Research, Inc.

Circle #116 on Reader Service Card

CPA II

GREATLY EXPANDED RELEASE OF OUR POPULAR
PERSONAL ACCOUNTING SYSTEM

- * Any number of Checking Accounts, Vendor and Cash Accounts. Automatic reporting of accounts due. Automatic posting to Vendor accounts.
- * Issue checks with up to 5 separate categories and/or tax flags per check. Print your checks with automatic addressing and memo line. Automatic checkbook reconciliation.
- * Track Income & Expenses for up to 35 categories each, Expenses vs. Budget, tax deductions, etc.
- * Screen or line-printer Bar-Graphs of monthly Actual vs. Budget for the year. Generate Income Statement, spreadsheets, a wide range of other reports. Can be used with any printer.
- * New, detailed 100 page manual, all system disks, custom check materials and registration for system updates.
- * For systems with 64K RAM; 2 or more disk drives; specify disk format. Send for detailed brochure.

MBASIC under CP/M or ZDOS - \$85.00 Postpaid



Circle #151 on Reader Service Card

The ILLUSTRATOR

The **ILLUSTRATOR** is a full-featured graphics drawing program for use with the Z-100 pixel graphics (w/wo color) or the H89/H19 IMAGINATOR pixel graphics option. No need for a lightpen.

Features Include:

- Turtle Graphics
- Rubber Banding
- Line Drawing
- Box Drawing
- Circle Drawing
- Ellipse Drawing
- Diamond Drawing
- Screen Print
- Dot Cursor Control
- Area Fill
- Box Fill
- Circle Fill
- Diamond Fill
- Copy Area
- Erase Area
- Text Mode
- Invert Mode
- Help Display
- 64 Colors
- Color Define
- Color Pattern
- Screen Save
- Screen Restore
- Area Save
- Area Restore
- Compacted Files
- more...

ONLY \$89.95!

HDOS version for H89, H8, requires IMAGINATOR
ZDOS version for Z-100, color memory optional
Supports many dot graphics printers. Call for info.

Newline Software
P.O. Box 402, Littleton, MA 01460 (617) 486-8535

NAME _____	CHECK ONE
STREET _____	<input type="checkbox"/> H89, H8/H19,
CITY _____	HDOS
STATE _____ ZIP _____	<input type="checkbox"/> Z-100, ZDOS
Send me _____ "The ILLUSTRATOR" program(s) at \$89.95 each.	
Check one: <input type="checkbox"/> payment enclosed <input type="checkbox"/> send COD (add \$4.00)	
Send order to:	
NEWLINE SOFTWARE, P.O. BOX 402, LITTLETON, MA 01460	
Foreign orders: add \$3.00 Airmail, \$10.00 for non-U.S. checks	

HDOS is a trademark of Heath Company
ZDOS, Z-100 are trademarks of Zenith Data Systems, Inc.
IMAGINATOR is a trademark of Cleveland Codonics, Inc.

Circle #145 on Reader Service Card

S-100 PC-video board. It seems to be a fairly straightforward task to interface a PC video card to the S-100 bus. This will be our strategy for performing tests. (Readers interested in this progress should contact us, since this article was written a couple of months before you read it)

There will always be some packages which use other, more obscure features of the PC directly, and hence will not run on the Z100. However, I believe we will see a tendency toward sticking to PC-DOS or the ROM routines if programmers want their software to run on machines that are almost PC-compatible. And that is a family of growing size.

Who's to blame?

When discussing the matter of PC-compatibility, it is not very long before accusations start flying as to who advertised what degree of compatibility, and why it isn't there. The implication exists that the H/Z100 is compatible with the PC. It is also clear that most buyers are ignorant of the fact that compatibility comes in degrees. They should be asking, "How compatible is it?" rather than just, "Is it compatible?"

We are very sympathetic with Heath/Zenith users because the equipment comes so close. And in fact, the H/Z100 is a better machine (in our opinion). Unfortunately, many users don't realize

the widespread practice of circumventing MS-DOS. This is all the more sad because it is actually the "runs-under-PC-DOS" packages which have contributed to customers' misunderstandings. These packages more accurately should state something like "runs under PC-DOS and requires the PC's ROM." The fact that such a program can actually be seen in the directory on an H/Z100, and then crashes when run, makes customers angry with Heath/Zenith, not with the software writers.

Whether or not one is understanding about the incompatibilities, however, there is still a benefit to be had from owning an MS-DOS machine. And that is that there are a lot of programmers writing for PC-DOS. As the PC-"compatible" market grows, these packages will become available for the other machines. The same could not be said for a machine based, say, on a Z8000 processor.

Other "compatibles"

This brings us to the topic of other PC-"compatible" machines. If you are considering the purchase of a PC-compatible, you should carefully check the compatibility claim. Based on the discussion here, you now know that, to be PC-compatible, the machine must provide PC-like ROM calls. (Although they need not actually be in ROM, nor at

the same location in memory.) It must also provide video memory which looks just like the PC's.

You will find this combination elusive, and even the information is difficult to elicit, with misinformation abounding. For example, a reviewer for *Byte* magazine, looking at a recently released PC-compatible portable, stated that he thought it would run more software if a PC video card were stuck in one of its PC-compatible expansion slots. Oh yes? And where are the software interrupts to operate that board? And how do you switch between that machine's own video and the PC-card?

As you can see, the Elusive-Compatibility Problem is not just Heath/Zenith's. And irrespective of it, the H/Z100 remains a machine with many praiseworthy features.

Ordering Information

IBEm, \$79.95 plus \$4 shipping and handling to U.S. and Canada, \$12 elsewhere; California residents please add 6% sales tax.

Wideman Computer Consulting
1320 Pepper Villa Drive
El Cajon, CA 92021

The Norton Disk Utilities
Peter Norton
2210 Wilshire Boulevard
Santa Monica, CA 90403

INTELLIBURNER

EPROM-EEPROM-MICROCOMPUTER PROGRAMMER

UNIVERSAL PROGRAMMING CAPABILITIES AT AN AFFORDABLE PRICE

- Ultra Fast Programming - 2716's in 16 Seconds
- Programs & Verifies 8K thru 256K Single Voltage EPROMs
- Erases, Programs & Verifies 2815 & 2816 EEPROMs
- Programs & Verifies 8748 and 8751 Series MICROCOMPUTERS*
- Programming Characteristics Selected by Convenient Personality Jumper Plug (Dip Header)
- Program, Verify, Status, & Diagnostic Display with Tricolor LED
- Serial Interface - 3, 4, or 5 wire - 1200 to 19200 Baud
- Supports XON/XOFF and READY/BUSY Protocols

NO SPECIAL SOFTWARE REQUIRED. Transfer disk files (Intel Hex Format) to EPROM with your system's line printer or modem software. Transfer EPROM contents to disk file in Intel Hex Format with your system's modem software. Or use the supplied software ** to transfer any binary or ASCII file to/from EPROM.

PROGRAMS:

2758	2716	27128	27C16	2815	8748*
2516	2732	27128A		2816	8749*
2532	2732A	27256			8751*
2564	2764	68764		8741*	8742*

*Requires low cost personality adapter avail. 6/84

SOFTWARE AVAILABLE FOR:**

CP/M systems on 8" SSSD - many 5 1/4 formats
TRS-80 Model III TRSDOS 1.3
Heath H8/H89 HDOS & CP/M
ZENITH Z90 & Z100 CP/M
KAYPRO

IntelliBurner Programmer with Software \$269.00
RS-232 Interconnect Cable 9.00

Low Cost "DumBurner" serial programmers harness the power of your personal computer with the supplied software for full programming capabilities:

DumBurner II Programmer for 28 Pin and 24 Pin EPROMs and EEPROMs (with Software) \$189.00
DumBurner II Bare PC Board, Plans & Software 39.00
16K/32K DumBurner for 24 Pin EPROMs (with Software) 139.00
16K/32K DumBurner PC Board, Plans, & Software 25.00

Add \$2.00 Shipping & Handling; C.O.D.s accepted; Foreign Orders add required postage. Specify Environment and Media Requirements. H8, H89, Z100 are TM Heath/Zenith; CP/M is TM Digital Research. TRS-80 Model III is TM Tandy Corp.



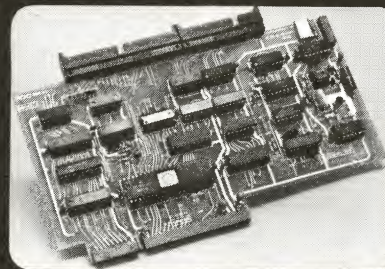
ROSS CUSTOM ELECTRONICS
1307 Darlene Way-Suite A12
Boulder City, Nevada 89005

PHONE (702) 293-7426

Circle #152 on Reader Service Card

1 CONTROLLER

FOR 8" & 5.25" DRIVES



Now be able to run standard 8" Shugart compatible drives and 5.25" drives (including the H37 type) in double and single density, automatically with one controller.

Your hard sector 5.25" disks can be reformatted and used as soft sector double density disks. The FDC-880H operates with or without the Heath hard sector controller.

NEW PRICE \$495

Includes controller board CP/M boot prom, I/O decoder prom, hardware/software manuals BIOS source listing.
HDOS driver now available for \$40.00.

5-20 day delivery-pay by check, C.O.D., Visa, or M/C.



Contact
C.D.R. Systems Inc.
7210 Clairemont Mesa Blvd.
San Diego, CA 92111
Tel. (619) 560-1272

Circle #109 on Reader Service Card

H/Z89 PERIPHERALS from SECURED COMPUTER SYSTEMS

PORT SERIAL CARD I/O 3 PORT PARALLEL

"... not your typical vanilla-flavored serial and parallel interface ..."



Features:

Chip independent design • Reduces computer data buss loading from 3 to 1 • Choice of Centronics or Epson parallel drivers for HDOS or CP/M • Complete documentation and installation instruction

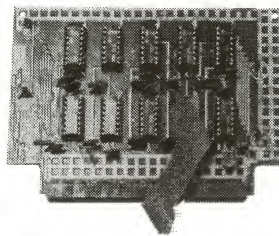
- 2 Serial Ports
- Supports: Ring Input External Clock Auto Dialer
- 3 Port Parallel with 2 Level Interrupt Control
- Fully compatible with all models of H/Z 88, 89, 90 using CP/M or HDOS.
- Fully tested, 90 day warranty, two serial cables and a parallel cable (internal to computer) and software driver.

PRICE \$199.00

Shipping & Handling \$10.00

16K RAM EXPANSION CARD

Expands your H/Z89 RAM Memory capacity to a **FULL 64K!**



Fully compatible with:

H/Z 89 • H/Z 88

Magnolia Microsystems

CP/M and disk drive I/O interface cards

NOW INCLUDING SUPPORT MOUNTING BRACKET

Featuring:

Complete installation instruction • 90 day Warranty Field reliability record now entering its 21st month

Now Only \$65.00

HDOS is a registered trademark of Heath Company
CP/M is a registered trademark of Digital Research

Shipping & Handling \$5.00



PRICES ARE LESS SHIPPING AND TAX IF RESIDENT OF CALIFORNIA
MAIL ORDER: 12011 ACLARE, CERRITOS, CA 90701 (213) 924-6741

TECHNICAL INFO/HELP:

8575 KNOTT AVE., SUITE D, BUENA PARK, CA 90620 (714) 952-3930

Terms and specifications subject to change without notice.

ZENITH
data systems
SERVICE CENTER

Circle #157 on Reader Service Card

H/Z-100 COLOR GRAPHICS SOFTWARE

Want to explore **Z-BASIC** color graphics the easy way? Try these packages from **MICROSERVICES**. All you need is a color configured computer with 128K memory, a color monitor, and **Z-BASIC**.

ZANIMATE will help you rapidly draw and paint each frame in an animation sequence. Select frame sizes, vary location and time between each frame. Draw the background too, with the graphics editor **\$64.95**

ZPALETTE, the original H/Z-100 palette program, contains a graphics editor for point-plotting images which can be painted in 92 hues! File your images for access by other **Z-BASIC** programs, and transfer imagery from one file to another.

NEW PRICE **\$59.75**

ZPATTERN helps you determine the quality of your color monitor and if it needs maintenance.

NEW PRICE **\$24.95**

Include 3% handling/postage (\$2.50 minimum) — California add 6½% tax. Send check or money order to:

MICROSERVICES
P.O. BOX 7093
MENLO PARK, CA 94026
PHONE: (415) 851-3414

Circle #209 on Reader Service Card

ARE YOU PREPARED FOR TAX TIME?

TAXTIME will assist you in preparing and calculating your 1983 Federal Income Tax forms. **TAXTIME** simplifies filling out the forms by leading you through a series of formatted questionnaires. **TAXTIME** includes formatted questionnaires for IRS Forms 1040, Schedules A, B, and C. Schedule C is processed separately so that several Schedule C business activities can be calculated and combined on Form 1040. Information from Schedules D, E, F, and the many numbered Forms are calculated separately and entered on the questionnaires. Forms G, W, and 2210 are calculated automatically when required. **TAXTIME** makes decisions on Income Averaging, Marital Deduction, and penalty Form 2210 if necessary. **TAXTIME** then processes the information you enter, performs the necessary calculations, and produces a computer printout for direct transfer onto IRS forms. Requires a printer.

ONLY \$59.95!

CP/M version for H89, H8, requires CP/M and MBASIC
ZDOS version for Z-100, requires ZDOS and ZBASIC

NEWLINE SOFTWARE

P.O. Box 402, Littleton, MA 01460 (617) 486-8535

ORDER NOW ... SHIPMENTS BEGIN JANUARY 15, 1984

NAME _____
STREET _____
CITY _____
STATE _____ ZIP _____
CHECK ONE
☐ H89, H8, CP/M
☐ Z-100, ZDOS

Send me _____ **TAXTIME** program(s) at \$59.95 each.
Check one: ☐ payment enclosed ☐ send COD (add \$3.00)
Send order to:

NEWLINE SOFTWARE, P.O. BOX 402, LITTLETON, MA 01460
Foreign orders: add \$3.00 Airmail, \$10.00 for non-U.S. checks

CP/M is a trademark of Digital Research, Inc.
MBASIC is a trademark of Microsoft, Inc.
ZDOS, Z-100 are trademarks of Zenith Data Systems, Inc.

Circle #145 on Reader Service Card



Controlled Data Recording Systems Inc.

ANNOUNCING THE FDC-H8

DOUBLE DENSITY 8" AND 5.25" CONTROLLER FOR THE H8 COMPUTER

Has all of the capabilities of our popular FDC-880H controller, with the added features of;

- Direct memory access (DMA) data transfer.
- Hard sector controller (H17) incorporated on the board.
- Runs with the standard 8080 CPU card and with Z80 CPU upgrades.
- Accesses both hard sector disk formats and soft sector disk formats through the same drives attached to the FDC-H8 without hardware additions.

Price \$495.00

NEW PRODUCTS FOR THE FDC-880H

DM-1 DUAL BOARD MODIFICATION KIT

\$29.95

Allows for both the FDC-880H and the H88-4 controller cards to interface with the same 5.25" drives. Drives will run as both hard sector format and soft sector format depending upon the logical drive letter.

CDR BIOS by Livingston Logic Labs

\$60.00

Enhanced version of Heath/Zenith CP/M 2.203 BIOS with ZCPR. Supports all Heath/Zenith disk formats through the FDC-880H and the H17 controllers.

CDR DVD by Livingston Logic Labs.

\$40.00

HDOS driver for running double density HDOS through the FDC-880H

Shugart Slimline 5.25" 40 track double sided drives

\$275.00

Shugart Slimline 8" double sided drives

\$525.00

Contact:

C.D.R. Systems Inc.

7210 Clairemont Mesa Blvd, San Diego CA 92111

Telephone: (619) 560-1272

5-20 day delivery—pay by check, C.O.D., Visa, or M/C

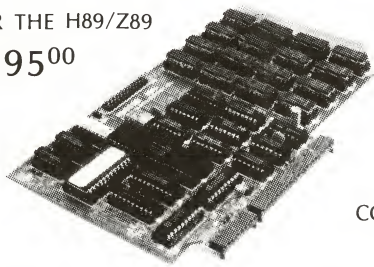


Circle #110 on Reader Service Card

SPOOLDISK™ 89

FOR THE H89/Z89

\$395⁰⁰



TAKE THE
WAIT
OUT OF
COMPUTING!

Is your floppy slowing you down? Does your computer go 'out to lunch' when you use your printer? Well, take a look at our Spooldisk Emulator and Printer Spooler card. Not just memory but a tiny microcomputer in its own right, the Spooldisk emulates a 128K byte disk plus it allows any files stored on itself to be output to a printer without intervention of the host H89/Z89. Don't let your disk or printer slow down your computing, add a Spooldisk to your system today. For more information on the Spooldisk or our other H89/Z89 products, write or call.



FBE RESEARCH COMPANY, INC
P.O. BOX 68234, SEATTLE, WA 98168
206-246-9815 (EVENINGS)

Circle #116 on Reader Service Card

MMM	EOX	ALS	AMR	GAO	PEP	KO	ARC	TX
5 1/4	10s35 1/2	19 1/4	3s3 1/2	18	4s35	3s49 1/4	49 1/2	38

Stock Management Data Base

This DATA BASE, a series of interrelated programs, keeps track of your investments in the Stock Market. The DATA BASE allows you to create as many new accounts as you have disk space, input pertinent information, then manipulates this info and produces several types of reports.

Features:

- *Menu driven and friendly
- *Multi accounts per disk
- *Multi account printouts
- *Processes DOW-JONES quotes
- *Automatic/Manual update
- *Five different reports
- *Separates OPTIONS reports
- *Shows change trends
- *Creates Sold issues file
- *Computes Short/Long term
- *Purges main file yearend
- *Summary tables for profit and loss planning
- *Creates a Master account by merging data files
- *Computes broker charges
- *Alphabetizes (sorts)
- *Hands off Demo included
- *55 page manual & examples
- *Telephone support

If you are involved in the Stock Market, this is the model designed for you. Created by a programmer/investor. Modified and expanded during 4 years of actual use managing portfolios.

Available for the following:

MS-DOS—Z-DOS
Zenith, IBM PC, Corona,
Texas Inst. PC, COMPAQ

CP/M
Heath/Zenith 89, 90, 100
(soft or hard sector)
Osborne 1, Kaypro, Epson

For more details see *Buss* issue #70, page 3.

Requires 48K memory (64K for soft sector CP/M H/Z89).
Supplied in 5" disk.
Specify format.
Send check or M.O.

Investors of Miami
Vincent Arias
501 Arvida Pkwy.
Miami, FL 33156
305/667-0500

ONLY \$195.

MMM	EOX	ALS	AMR	GAO	PEP	KO	ARC	TX
5 1/4	10s35 1/2	19 1/4	3s3 1/2	18	4s35	3s49 1/4	49 1/2	38

Circle #140 on Reader Service Card

Screen Dump!

Don't let your computer be overwhelmed by an avalanche of characters when the screen is transmitted.

Siebert Ickler

The terminal screen of your computer often contains a lot of useful information. At least I pretend mine does. There are many times when it would be extremely helpful to have that screen image saved. It helps in debugging programs to have a picture of what actually happened when the program went awry. The exact error message is often necessary in communicating with vendors. It saves time and prevents errors in sending patch listings to Buss or to your friends. Often, it would be handy to save the output of the operating-system utilities. Most of them only list their information on the console, which is the terminal screen on both the H/Z89 computer and the H8 with H/Z19 terminal.

Also, the H/Z89 and H/Z19 each have a set of 33 graphics characters which can be used to create pictures and charts on the screen. But the operating systems and utilities supplied by Heath make no use of them and provide no simple access to them for printing on paper or saving on disk. The only suggestion in the Heathkit manual is to write a BASIC program to PRINT on screen the appropriate control characters required to make a picture such as the American flag. This method is unsatisfactory for children and other impatient artists.

The terminal, however, comes with all the facilities required to move the cursor around the screen and to allow you to create a picture or graph. If you press the OFF LINE key, you can use the chart in the manual as a guide to the appropriate escape sequences and graphics characters and create a pretty picture or impressive chart on the screen. But wouldn't it be nice to be able to save that image and be able to display it later? If you could save the images you had created, they could be used later, as menus for programs or as part of a game.

This article will tell you how to capture the contents of the screen of your H/Z89 or H19. It will present working programs for capturing the screen image, saving it in memory, printing it, and saving it on disk. This leaves you with a skeleton around which you can build your own program—such as a one-screen picture editor or a dump-to-printer exit for the operating system.

However, this is all done in assembly language—which makes the program

more difficult to write. You may wish to refer to the examples in the Heath and operating system manuals for help; and there are many useful articles in previous issues of *Sextant*. (A brief introduction to assembly language appeared in issue #8, Winter 1984, "Getting Into Z-DOS Assembly Language—Quietly," by D. C. Shoemaker. There is also "Disk Programming Without HDOS" by Richard E. Smith in issue #1, Spring 1982. And you may want to take a look at "An Introduction to CP/M for Assembly Language Programmers," by J. C. Hassall in *Sextant* #5, Spring 1983.)

To follow the text exactly, you must have the CP/M operating system, running on an H/Z89 or H8-H/Z19. You will have to be able to enter a program

The program is fast enough to keep up with the terminal and it turned out not to be particularly difficult.

with an editor, assemble the result using the CP/M ASM utility, and load the result with CP/M's LOAD program. You will also need DDT, a standard CP/M utility program used to debug and patch programs. We will use it to examine memory. The CP/M utilities are all documented in the CP/M manuals provided by Heath when you purchase CP/M.

Hints on converting these programs for use under the Heath Disk Operating System (HDOS) are provided near the end of this article. But those of you running under HDOS will have to have a greater level of expertise than the user of CP/M. Under HDOS, you will not only have to know how to enter a program and assemble it, but also how to write a program to open and close a device driver or file and write to it. The HDOS information is contained in Heath's Software Reference manuals for HDOS and the HDOS System Programmer's Guide.

How did I find out?

Like a lot of you, I built my '89 from a kit. Sure, I had a lot of practical uses in mind, like word processing and writing software to sell. Perhaps I could even

invent the next program which would sweep the field like the Calcs have. But I also wanted it just to have a computer. I work with large mainframe computers and the thought of being able to actually own a computer was irresistible. And, of course, I bought it to learn. And since I wanted to learn everything I could about it, I read the manual from cover to cover.

I don't know if this has happened to anyone else, but my kit came a unit at a time over several weeks. So I had plenty of time to read the manual. Because my disk drive came last, I played with the computer as best I could, which mostly meant learning about the terminal and its features. I managed to find a use for most of the escape sequences, but the transmit-page function (ESC #) escaped me. The little note that the computer needs a special routine to use this feature sounded like a challenge.

The transmit-page command causes the terminal portion of the H/Z89 to send the contents of its memory, which contains an image of the screen, to the computer portion of the H/Z89. It sends an exact copy of the screen with the appropriate escape sequences embedded to enter and exit reverse video and enter and exit graphics as required by the screen contents. It transmits from the upper left corner of the screen, sending all 80 characters, including blanks, on each of the 24 lines. It sends only one carriage-return character—at the end of the transmission—and beeps once at the end. So it sends a minimum of 1,921 characters.

This seemed like a nice feature to use. As I said, I often would like to save the contents of the screen (or print them). Moreover, I could envision a simple full-screen editor which used all the features and keys of the H/Z89.

So I set out to transmit a page to a program. First, I tried it under HDOS, in Benton Harbor BASIC. I printed the sequence (ESC #) and tried to read the characters. I quickly concluded that it was designed to sound the speaker. What I was hearing, of course, were the warning beeps from the operating system trying to tell me that its console input buffer was full.

This is because the console input to the operating system (under both HDOS and CP/M) is invoked by an interrupt generated by the console it-

self. So when the terminal portion of the H/Z89 starts sending, it pretty much takes over the whole machine. It interrupts the computer's console input routine to send its next character to the buffer almost as soon as it finishes transmitting the last one. This does not leave time enough for a BASIC program to read the characters from the buffer.

Normally, BASIC wouldn't even try to read the characters at all until it got a complete line delimited by a carriage return. I had, however, thought of that and had instructed HDOS to send the characters immediately by **POKE**ing the HDOS console mode byte (location 8406) to indicate character mode (value 129). This location and its values are described in the HDOS System Programmer's Guide.

And I used Benton Harbor BASIC's character input function (**CIN**) to try to get them as fast as they were sent. It wasn't fast enough, however. And since the buffer typically holds about 100 characters, and the terminal sends at least 1,921, the buffer is quickly filled. Then you get to listen to 1,800 or so warning beeps in a row. Since they come so close together, it sounds like one long tone.

Of course, I hadn't really expected this to work because of the note in the manual about needing a "special routine." I suspected this meant that I would have to use assembly language.

The first assembly-language routine I

tried was to change the console-interrupt location to jump to my program, instead of to the operating system's interrupt-handling routine. The console-interrupt location is called **UIVEC** in the monitor listing provided by Heath with the H/Z89 computer. The monitor listing is in a section of its own and has instructions for usage. I have found it quite handy for learning about the H/Z89 and would like to insert a little plug here to thank Heath for including it and to recommend it to anyone who plans to really understand the H/Z89. There is a comparable listing for the H8.

By placing the location of my interrupt-handling routine in the **UIVEC**, my program should have received the characters (instead of the operating system receiving them). But I was unable to make this method work. Heath hadn't yet made the source code to HDOS available. And I didn't have the CP/M BIOS yet, so I had no interrupt-handler routine to study. Never having written one before, I must have done something wrong. My routines always failed to return control to HDOS.

In any event, I had already thought of an alternative method, which was to disable interrupts entirely and have my program read the console directly. I tried to do this in BASIC but again was unable to make it work. It probably failed because of BASIC's slowness. Or perhaps I **POKE**d the wrong locations

because I hadn't correctly translated the split-octal notation used in the monitor to the decimal notation required by BASIC.

I was quick to go back to assembly language, anyway. I don't like **PEEK**s and **POKE**s, and assembly language was more fun to learn. And I finally succeeded! The monitor listing again proved particularly useful.

I patterned my console input/output (I/O) routines after the monitor routines called **RCC** and **WCC** (for read character from console and write character to console, respectively). The program is fast enough to keep up with the terminal and it turned out not to be particularly difficult. I have since included this code in programs written both for HDOS and CP/M to dump the screen. And I have used it as a one-screen picture editor. Since this method worked, I quit trying to find out why my interrupt handler didn't.

Sending the screen to memory

To understand the program better, look at Listing 1. This program, called **FS**, and all the programs in this article are for CP/M in 8080 assembler language. If you assemble this program, load it, and then run it, you will find that it appears to be quite useless. The screen will flicker briefly and then the bell will ring and you will return to CP/M.

However, if you examine memory, you will find the contents of the screen,

ACCESS is easy communications



- **PREFERRED BY PROS:** A major dealer of H/Z systems, Doug Von Koenig of Toledo, OH, says, "Bar none, ACCESS is the best communications program for any H/Z computer."
- **MOST COMPLETE, EASIEST TO USE:**
 1. Use any smart or dumb modem to tap any remote system (Compuserve, Source, bulletin boards, etc.), or
 2. Connect directly to any adjacent system using ACCESS's versatile hardware and software handshaking.
 3. Transfer text directly or transfer any type of file using error-correcting protocol (XMODEM-compatible, checksum or CRC).
 4. Use autopilot feature for unattended communication sequences complete with conditional tests, branching, auto-dial, auto-logout, etc.
 5. Set all your configuration and hardware details from within ACCESS—no patching.
 6. Reconfigure instantly by recalling any one of several previous setups.
 7. File transfers to/from a system equipped with ACCESS can be controlled remotely.
 8. Print data as it is received even with a slow printer and fast modem.
 9. Works smoothly and reliably, 110 to 9600 baud.
 10. Available in all 5 1/4" formats (please specify) with concise, indexed manual.

Get ACCESS and tap in!

- ☐ For 8-bit CP/M on H/Z-89 or H/Z-100 (specify).....\$39.95
- ☐ For 16-bit ZDOS on H/Z-100.....\$39.95
- ☐ BOTH 8-bit CP/M and 16-bit ZDOS versions for your H/Z-100

Save \$30!.....\$49.95

Ask your local H/Z dealer or order direct (add \$3 handling)

Hilgraeve Inc.

P.O. Box 941, Monroe, MI 48161
(313) 243-0576



Dealer inquiries invited

INTERACTION DYNAMICS SYSTEMS™

SoftTouch™: A key remapping utility for the Z-100 that redefines any keyboard keys to your specifications for any application program, assigning labels for the remapped keys on the 25th line. **Fast**—does not require a slow co-resident program. Price includes Z/STAR. \$39/\$3 manual only (3,4)

SLEDGE™: The mean general ledger that does it the way a computer does it best. Includes format-controlled charts of accounts, customized statements, budget comparisons, help screens, and much, much more. \$100/\$15 demo and manual (1,2,3,4)

FLIGHT SIMULATOR: Fly a 747/Cessna/glider anywhere. Many features and settable conditions. Requires 64K. \$29/\$3 manual only (1,2,3)

GRAPH-IT: Plot up to 50 functions on any line printer. Create data files with SuperCalc, dBASE II, BASIC, WordStar, and other programs. Many options, thorough manual. \$29/\$3 manual only (1,2,3)

Z/STAR: Defines and labels all special function and keypad keys for Z-100 users of WordStar (any version). Installation requires only copying files to WordStar disk, results in a **logical** extension of WordStar commands. \$24/\$2 manual only (3,4)

Z/BASE: like Z-STAR, but for dBASE II. \$24/\$2 manual only (3,4)

89/STAR: like Z-STAR, but for the H-89 and WordStar thru V.3.0. \$29/\$2 manual only (1,2)

EP/STAR: configures WordStar for Epson. \$19/\$2 manual only (1,2)

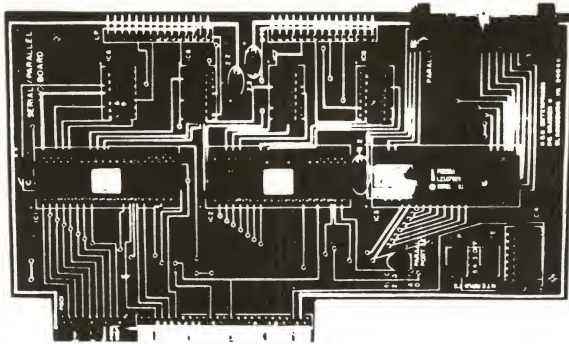
*Add \$2 per order for postage and handling

*Disk formats available indicated in parentheses

- (1) HS-89-80 for H89 & CP/M-80
- (3) SS-100-85 for Z100 & CP/M-85
- (2) SS-89-80 for H89 & CP/M-80
- (4) DS-100-ZD for Z100 & Z-DOS

KAPAAU, HAWAII 96755-0419

THE ORIGINAL SERIAL/PARALLEL INTERFACE BOARD



Replace the H88-3 to upgrade your system or use the KC1222 in place of it. Providing the two standard serial ports PLUS three parallel ports on one card, you have the best of both worlds. Use the parallel ports for printer, joysticks, instrumentation/control...KC1222 has all components including cables and hardware. KP1222 has the same items less the serial chips and cables.

PRINTER DRIVERS: The C.Itoh, Epson, Okidatas, Gemini and others are supported under HDOS and Heath's CP/M.

KC1222 Complete Kit	\$128.00	PC1222 Bareboard	48.50
KP1222 Parallel Only Kit	97.00	Printer Drivers HDOS or Heath's CP/M	20.00

Printer Packages: We support the following printers as packages. We check out and set up the printer for your system. All you need do is plug it in and start using it! No more having to fuss with switch settings, making cables or any other aggravation. Included is HDOS or CP/M software, cable and checked out printer. Prowriter packages include 3K buffer upgrade.

Dot Matrix			
Prowriter Package	\$440	Prowriter II Package	\$720
Gemini 10 Package	390	Gemini 15 Package	585
Daisy Wheel			
Silver Reed EXP 500P Package	550	Silver Reed EXP 500P Package	795

C.Itoh A10-20 Package	595
TTX-1014 Package	550
C.Itoh F10 (55) Package	1525

We also carry printer spoolers; contact us for particulars.

ZDS HARDWARE - PRINTER PACKAGES - SOFTWARE

MATHGEN: The keyboard math interpreter brings mathematics to life! Function roots, max and min, evaluate function integrals and first derivatives, hyperbolics, exponential forms, logs, trig functions, factorials, the list goes on! Define the functions from a file, batch processing style, or from the keyboard. Plot to the screen or your printer. CP/M or HDOS for only \$40.00

DATAPLOT: Using the dot addressable graphics of your Prowriter, plot any definable math function in single or double density. Select axis size and scale, plotting quadrant, etc. Generate your data by MATHGEN, MBASIC or any other language. CP/M or HDOS for \$25.00

PRN: A printer utility for the Prowriter, Epsoms, and the H14. Print headers, footers, pause at page end, print multiple copies, left margin, printer mode and a host of other functions. CP/M or HDOS for \$25.00

JS: Use your parallel ports for REAL TIME joysticks! Use up to four at a time with your favorite MBASIC or machine language keyboard game for HDOS. Program the response speed of the sticks, key sequence for different games, etc. Uses Atari joysticks. Only \$25.00

dBASE II	\$480	Friday	\$245
Perfect Writer	280	Image	265
Perfect Clac	180	Lotus 1-2-3	400
Cache/Q	195	SuperSort	165
MITE	125	Benchmark V3.0	400
Jupiter (Power Line Systems)	145	Z-100 Screen Dump	25

This is but a partial list of the software we carry. If you need an item not listed here, call us - we either may already have it or can get it for you.

We fully support all of our independent-vendor products. If you have a question, we will never refer you to someone else.

As authorized ZDS dealers, we support the Heath/Zenith community with competitive prices and post sales support. Contact us for price and delivery on the Z system and accessories of your dreams.

VA residents add 4% tax. All of our products are shipped postpaid in the continental U.S. Otherwise, please add 5% for shipping. Foreign orders in U.S. dollars or drawn on a U.S. bank. Also includes customs house and address.

Group purchase discounts are available - contact us for details.

H & H Computer Enterprises, Inc.
P.O. Drawer H Blacksburg, VA 24060
(703) 552-0599

Circle #123 on Reader Service Card

MAIL MASTER®

— SPEEDS YOUR MAIL!

designed for use on ZENITH/HEATH Computers with at least 48K RAM Memory, using the CP/M Operating System*, one or more 5-1/4" disk drives and printer. It will run on the Z100/H100 System with CP/M*85 and on the Z89/90 and H89/90 with CP/M*80. This package has four different programs (and easy-to-use booklet), as follows:
CREATE/COM — The first part of this program allows the user to enter the following data into memory: Special ID, Code Number, Names, Addresses, Telephone Numbers, etc. Program is displayed on the screen and is self-explanatory; when terminated, it provides a mailing list stored on the disk.
SORT/COM — The second part of this program sorts the newly-created mailing list in three ways:

- [A] Alphabetic order, for a quick search of names.
- [B] Zip code, for bulk mailing at low postal rates.
- [C] ID code, for sorting special categories.

PRINT/COM — The third part of this program sends instructions to a printer for printing selected files of labels, with or without telephone number or special ID code, ganged-up or printed one label on each page.

EDIT/COM — The fourth part of this program permits search of specific records, correction and deletion.

Many similar programs are sold at a price three to four times higher and do not include half of the functions of ours. Our special price is now \$59.95, with shipping. NY State residents add sales tax. Allow two weeks for delivery.

This package available in English (order S/N 083-E55-XXX); French (S/N 083-F55-XXX); and it will soon be available in Spanish (S/N 083-S55-XXX).

AT MSTC WE WORK FOR YOUR FUTURE AND OURS

THIS PROGRAM IS: Interactive - Menu Driven - Powerful — and Uses Full Zenith/Heath Capabilities (i.e. 25th Line)

M S T C
MICROCOMPUTERS SOFTWARE TECH CONNECTION
75-23 Main Street PO Box 111 Flushing, NY 11367
* Reg TM Digital Rsch Corp (212) 263-9100, ext. 111

Circle #159 on Reader Service Card

FREE SOFTWARE

PUBLIC DOMAIN DIRECTORY

NOW AVAILABLE ON HEATH CP/M 5 1/4" FORMAT DISKS.

CONTAINS MORE THAN 3,000 ENTRIES.

SUPPLIERS' NAMES AND ADDRESSES INCLUDED.

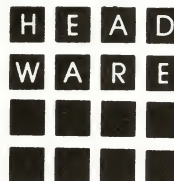
ASTRONOMY, AVIATION, BUSINESS, EDUCATION, ENGINEERING, GAMES, GRAPHICS, HAM RADIO, MUSIC, PROGRAMMING, TEXT EDITING, VOICE SYNTHESIS, UTILITIES AND MUCH MORE.

SHIPPED POSTPAID. MONEY BACK GUARANTEE.
SORRY, NO CREDIT CARD OR PHONE ORDERS. ALL 48 TP1:

☐ ON 3 HARD
SECTORED SD
\$17.00

☐ ON 2 SOFT
SECTORED DD
\$12.00

☐ ON 1 DOUBLE
SIDED DD
\$7.00



FREE BONUS UTILITY
PROGRAM INCLUDED

2865 AKRON STREET
EAST POINT, GA. 30344

Name

Address

City, State

Zip

Circle #192 on Reader Service Card


```

0100          ORG      100H
00E9 =        CSTAT  EQU      0E9H ;CONSOLE INTERRUPT ENABLE
                                ;REGISTER PORT
00ED =        CTHRE  EQU      0EDH ;CONSOLE LINE STATUS REGISTER
                                ;PORT
00E8 =        CONS   EQU      0E8H ;CONSOLE DATA PORT
001B =        ESCAPE EQU      27  ;ESC CHAR
0100 =        START: EQU      $
0100 DBE9          IN      CSTAT
0102 323E01        STA     INT      ;SAVE CURRENT STATUS
0105 AF            XRA      A        ;ZERO A
0106 D3E9          OUT     CSTAT ;SHUT OFF INTERRUPTS TO CP/M
0108 213F01        LXI     H,BUFFER
010B DBED          RL:     IN      CTHRE
010D E620          ANI     40Q      ;HOLDING REGISTER EMPTY?
010F CA0B01        JZ      RL      ;NOT READY YET
0112 3E1B          MVI     A,ESCAPE
0114 D3E8          OUT     CONS
0116 DBED          RL2:    IN      CTHRE
0118 E620          ANI     40Q
011A CA1601        JZ      RL2
011D 3E23          MVI     A,'#'
011F D3E8          OUT     CONS ;TRANSMIT PAGE REQUEST IS
                                ;ESC #

0121 DBED          INLP:   IN      CTHRE
0123 E601          ANI     1        ;CHAR READY TO SEND?
0125 CA2101        JZ      INLP    ;NOT YET
0128 DBE8          IN      CONS
012A E67F          ANI     177Q    ;STRIP PARITY? - COPIED FROM
                                ;MONITOR
012C FE0D          CPI     15Q    ;CR SENT AT END OF SCREEN
                                ;IMAGE
012E CA3601        JZ      ENDIN   ;IF CR GO TO END
0131 77            MOV     M,A
0132 23            INX     H
0133 C32101        JMP     INLP
0136 3A3E01        ENDIN:  LDA     INT
0139 D3E9          OUT     CSTAT ;RESTORE CONSOLE INTERRUPTS
013B C30000        JMP     0      ;WARM BOOT TYPE EXIT
013E              INT      DS      1
013F              BUFFER  DS      5640
1747              END      START

```

Listing 1: FSASM will send the contents of the screen to memory.

as it was just after you typed FS, in the area starting at location 013F (called BUFFER in the listing).

But first, let's discuss how it works.

Recall how transmit-page functions. When you send the transmit-page command (ESC#) to the terminal, it sends the image of the screen to the computer.

This is the image as it appears, not as it was entered. It sends the image one character at a time starting at the upper left corner exactly as it appears on the screen—including blanks. There are no carriage returns or line feeds at the end of each line. Each line is exactly 80 displayable characters long and by

counting the escape sequences (for graphics and reverse video) your program will be able to break it into lines, if desired.

One carriage return (octal code 15) is sent at the end of the entire screen. The terminal transmits the escape sequences to enter or exit reverse video or to enter or exit graphics mode as often as required to reconstruct the screen image.

In order to communicate to the console directly, we have to use the three ports defined at the top of the listing. These are: the interrupt enable register port; the line-status register port; and the console-data port, also called the transmitter holding register. (These are discussed in the INS8250 Asynchronous Communications Element description that was included with the H/Z89 documentation. In my documentation, it is an appendix to the H/Z89 operations manual.) Understanding how to use these registers and ports is where the monitor code comes in handy again. By examining the RCC and WCC routines in the monitor listing, we can see what to check for in these registers and how to go about it correctly.

Let's follow the program in Listing 1 in detail.

To follow the program, we will refer to the instructions by their starting location in memory. The locations are the four-character numbers in the first column of the listing. These are hexadecimal (H) numbers, to the base 16, so they run from zero to nine followed by A (for decimal 10) to F (for decimal 15). They indicate the memory location where the instruction or data will be stored.

Look first at the instruction starting at location 100 (labelled START:). The IN instruction there takes the value of the interrupt-enable register port and puts

GEMINI

PRINTERS - the 10X

EPSON MX Compatible - emulates all Epson codes, including bit graphics, underline, super/subscripts, print modes, etc. - PLUS 12 cpi mode, download characters. With friction & tractor feeds std. Parallel interface. With purchase, choose one of: Z-UTIL, HDOS or CPM Ultimate driver (specify).
PRICE: \$319.00 Postpaid.

MICROFAZER BUFFERS/CONVERTERS

8K Expandable buffer with COPY and PAUSE features. A real time-saver! Serial to Parallel 8-64K buffer is \$224 postpaid; Parallel to Parallel 8-128K buffer is \$154 postpaid.

LINDLEY SYSTEMS

21 Hancock St., Bedford, MA 01730
Telephone (617) 275-6821 evenings

Z-UTIL

\$35.00
ppd.

Z-DOS UTILITY PACKAGE

Includes the following:

RUNPC - Runs many IBM PC programs incl. MicroPro's Wordstartm, Ashton-Tate's Dbase II tm, Perfect series, many others
SCREEN - Full graphic screen dump for Gemini, Epson, NEC-8023 C. Itoh 8510, MT-160, and Microline 92/93 (72 col.)
Set margins & color planes
NOW! LOGIC-SEEKING FAST!!!

WE ALSO CARRY ribbon cartridges, ribbon refills, memory IC's, disks and drives, library cases, etc. WRITE for free catalog.

Prices include shipping and insurance.
Payment by personal check, company check, money order, P.O. US funds on US bank.

Circle #131 on Reader Service Card

The next instruction, XRA, zeroes the A register. We then send this to the interrupt-enable register port via the OUT instruction. This tells the INS8250 chip which controls the console port to disable interrupts. The instruction at location 108 points the HL register pair to the area of memory labelled BUFFER into which we will read the transmitted characters. The IN instruction at location 10B reads the value of the line-status register into the A register from the line-status register port. We want to examine bit 5 of this register to determine if the data register is empty so we can send our escape sequence to the console. We know which bit to check from the INS8250 documentation and the monitor listing. To do this, we use the instruction ANI (AND the byte immediately following the instruction with the contents of the A register). ANI 40Q (read: 40 octal) will set the zero status flag if bit 5 of the A register is zero. This is because the result of an AND instruction is a byte with ones in the bit locations where both operands have ones, and zeroes everywhere else. Since 40Q has a one only in bit position 5, we get a zero result unless the line-status register also has a one in bit position 5.

Locations 121 through 133 are our loop to read the characters sent by the terminal. Locations 121 through 125 consist of looping until there is data ready in the transmitter holding register (data port). Bit 0 of the line status register is checked for a one to determine this (using the `ANIL` instruction). In location 128, we read the character into the `A` register. The instruction at location 12A is an `ANI` to zero the parity bit (bit 7). The instruction at location 12C checks to see if the character read was a carriage return (15 octal). If it is, all characters have been sent so there is a jump to the ending routine. If it is not, the program stores the character in the buffer (`MOV M,A`), adds one to the buffer pointer (`INX H`) and loops back to read another character (`JMP INLP`).

The ending routine (locations 136 through 13B) consists of restoring the interrupt-status register and returning to CP/M. We use `JMP 0`; this forces a

0100		ORG	100H	
00E9 =	CSTAT	EQU	0E9H	;CONSOLE INTERRUPT ENABLE
				;REGISTER PORT
00ED =	CTHRE	EQU	0EDH	;CONSOLE LINE STATUS
				;REGISTER PORT
00E8 =	CONS	EQU	0E8H	;CONSOLE DATA PORT
0005 =	BDOS	EQU	5	;JUMP TO CPM
001B =	ESCAPE	EQU	27	;ESCAPE CHAR
0100 =	START:	EQU	\$	
0100 DBE9		IN	CSTAT	
0102 327F01		STA	INT	;SAVE CURRENT STATUS
0105 AF		XRA	A	;ZERO A
0106 D3E9		OUT	CSTAT	;SHUT OFF INTERRUPTS TO CPM
0108 218101		LXI	H,BUFFER	
010B DBED	RL:	IN	CTHRE	
010D E620		ANI	40Q	;HOLDING REGISTER EMPTY?
010F CA0B01		JZ	RL	;NOT READY YET
0112 3E1B		MVI	A,ESCAPE	
0114 D3E8		OUT	CONS	
0116 DBED	RL2:	IN	CTHRE	
0118 E620		ANI	40Q	
011A CA1601		JZ	RL2	
011D 3E23		MVI	A,'# '	
011F D3E8		OUT	CONS	;TRANSMIT PAGE REQUEST IS
				;ESC #
0121 DBED	INLP:	IN	CTHRE	
0123 E601		ANI	1	;CHAR READY TO SEND?
0125 CA2101		JZ	INLP	;NOT YET
0128 DBE8		IN	CONS	
012A E67F		ANI	177Q	;STRIP PARITY? - COPIED FROM
				;MONITOR
012C 77		MOV	M,A	
012D 23		INX	H	
012E FE0D		CPI	15Q	;CR SENT AT END OF SCREEN
				;IMAGE
0130 C22101		JNZ	INLP	;IF NOT CR GO BACK FOR MORE
0133 3A7F01		LDA	INT	
0136 D3E9		OUT	CSTAT	;RESTORE CONSOLE INTERRUPTS
0138 218101		LXI	H,BUFFER	;GO TO START OF
				;BUFFER AND PRINT IT
013B 7E	PRLP:	MOV	A,M	;GET THE CHAR
013C FE0D		CPI	15Q	;CR ? MEANS END OF SCREEN
013E CA6301		JZ	ENDLP	
0141 FE1B		CPI	ESCAPE	
0143 3A8001		LDA	COUNT	
0146 CA5301		JZ	ADDONE	;ALLOW FOR ESCAPE SEQUENCE
				;IN COUNTING
0149 3D		DCR	A	
014A 328001		STA	COUNT	
014D CC6901		CZ	CRLF	;OUTPUT CR AND LF IF ALREADY
				;PRINTED 80 CHARS
0150 C35701		JMP	LPR	;PRINT IT OUT
0153 3C	ADDONE:	INR	A	
0154 328001		STA	COUNT	
0157 0E05	LPR:	MVI	C,5	;BDOS CALL 5 - OUTPUT TO
				;PRINTER DEVICE
0159 5E		MOV	E,M	;CHAR TO PRINT
015A E5		PUSH	H	
015B CD0500		CALL	BDOS	;ASK CP/M TO PRINT THE
				;CHARACTER
015E E1		POP	H	
015F 23		INX	H	
0160 C33B01		JMP	PRLP	
0163 CD6901	ENDLP:	CALL	CRLF	;HAPPY ENDING
0166 C30000		JMP	0	;WARM BOOT TYPE EXIT
				SUBROUTINE TO OUTPUT CR-LF TO PRINTER
0169 1E0D	CRLF:	MVI	E,15Q	;CARRIAGE RETURN
016B 0E05		MVI	C,5	;BDOS CALL 5
016D E5		PUSH	H	
016E CD0500		CALL	BDOS	;ASK CP/M TO PRINT
0171 1E0A		MVI	E,12Q	;LINE FEED
0173 0E05		MVI	C,5	
0175 CD0500		CALL	BDOS	
0178 E1		POP	H	
0179 3E50		MVI	A,80	;RESTORE COUNT TO MAX
017B 328001		STA	COUNT	
017E C9		RET		
017F		INT	DS	1
0180 50	COUNT	DB	80	;# CHARACTERS IN A PRINT LINE
0181	BUFFER	DS	5640	
1789		END	START	

Sextant March-April 1984 65

CP/M warm boot but is the easiest way to return.

Testing FS

To verify the program's operation, we can test it as follows. First we assemble the program (using ASM) and then LOAD it as FS on the A: drive. DDT should also be on the A: drive. At the A> prompt, we type:

DDT FS.COM

This command loads DDT with FS under its control.

Next, DDT will give us a "-" prompt, at which we will type:

G100,13B

This runs FS, stopping at the JMP 0 instruction. At the "-" prompt, we type a third command:

D13F

to display the first 256 bytes in our buffer. Further D commands (D1F0, D2B0, D370, etc.) can be used to display the entire buffer. To exit DDT, type a CTRL-C.

Obviously, this is not particularly use-

ful. This code must be made part of a program to make it more useful. Such a program might copy the screen to the printer, set a function key for screen dumping, copy the screen to disk, or be part of a screen editor or a subroutine for MBASIC or some other language to

This leaves you with a skeleton around which you can build your own program.

capture the current contents of the screen. We'll use it here to copy the screen to the printer and to disk. We'll need to add the code to take the screen image from the BUFFER memory area and send it to the printer or disk file.

Sending the screen to the printer

Look at Listing 2, the program FSPRINT.

Listing 3: FSDISK will save the screen display to disk.

```

0100          ORG      100H
00E9 =      CSTAT   EQU      0E9H      ;CONSOLE INTERRUPT ENABLE
                                ;REGISTER PORT
00ED =      CTHRE   EQU      0EDH      ;CONSOLE LINE STATUS REGISTER PORT
00E8 =      CONS    EQU      0E8H      ;CONSOLE DATA PORT
0005 =      BDOS    EQU      5         ;JUMP TO CP/M
001B =      ESCAPE  EQU      27        ;ESCAPE CHAR
005C =      FCB     EQU      5CH       ;DEFAULT FILE CONTROL BLOCK MADE BY
                                ;CP/M FOR THE FILE ON THE COMMAND LINE
                                ;CP/M FILE BUFFER
0080 =      DMA     EQU      80H
0100 =      START:  EQU      $
0100 DBE9          IN      CSTAT
0102 32DA02        STA     INT          ;SAVE CURRENT STATUS
0105 AF            XRA     A            ;ZERO A
0106 D3E9          OUT     CSTAT        ;SHUT OFF INTERRUPTS TO CP/M
0108 21E402        LXI     H,BUFFER
010B DBED          RL:     IN      CTHRE
010D E620          ANI     40Q          ;HOLDING REGISTER EMPTY?
010F CA0B01        JZ      RL          ;NOT READY YET
0112 3E1B          MVI     A,ESCAPE
0114 D3E8          OUT     CONS
0116 DBED          RL2:    IN      CTHRE
0118 E620          ANI     40Q
011A CA1601        JZ      RL2
011D 3E23          MVI     A,'#'
011F D3E8          OUT     CONS        ;TRANSMIT PAGE REQUEST IS ESC #
0121 DBED          INLP:   IN      CTHRE
0123 E601          ANI     1           ;CHAR READY TO SEND?
0125 CA2101        JZ      INLP        ;NOT YET
0128 DBE8          IN      CONS
012A E67F          ANI     177Q        ;STRIP PARITY? - COPIED
                                ;FROM MONITOR
012C 77            MOV     M,A
012D 23            INX     H
012E FE0D          CPI     15Q        ;CR SENT AT END OF SCREEN
                                ;IMAGE
0130 C22101        JNZ     INLP        ;IF NOT CR GO BACK FOR MORE
0133 3ADA02        LDA     INT
0136 D3E9          OUT     CSTAT        ;RESTORE CONSOLE INTERRUPTS
0138 3A5D00        LDA     FCB+1
013B FE20          CPI     ' '        ;CHECK FOR BLANK - NO FILE
                                ;NAME TYPED
013D C27801        JNZ     CONTIN
0140 0E09          MVI     C,9         ;PRINT
0142 114B01        LXI     D,NOFILE
0145 CD0500        CALL    BDOS
0148 C30000        JMP     0          ;NO FILE NAME GIVEN SO QUIT
014B 4E4F204649NOFILE DB      'NO FILE SPECIFIED ON COMMAND LINE -
                                QUITTING$'
0178 0E0F          CONTIN: MVI     C,15 ;OPEN
017A 115C00        LXI     D,FCB
017D CD0500        CALL    BDOS        ;TRY TO OPEN FILE AS IF
                                ;EXISTS

```

The first part is the same as FS. We add the code from location 138 through 17E to print the contents of the BUFFER. The only change from the screen-reading logic of FS is to store the trailing carriage return so that we can use it as a marker in the print loop. The print loop basically takes each character to the printer from the buffer, adding a carriage return and line feed after each 80 characters.

Note the test for ESCAPE at location 141. This is done to make the count come out right if there were an enter or exit reverse video or graphics mode sequence. I send these to the printer in the example. Of course, this would create problems in actual use since the terminal and printer respond differently to given escape sequences. If you have an H/Z25 printer capable of handling the graphics, you should send the appropriate H/Z25 code instead of the one shown. If not, you should do something else when you see an ESCAPE—such as skip it (i.e., INX H twice and JMP PRLP) or refuse to continue (i.e., print a message and JMP ENDLF).

Try this program. As simple as it is you can use it as a screen copy program so long as you do not use reverse video or graphics. If you wish to capture the screen without the FSPRINT command being shown, and if you are sufficiently proficient with the escape sequences, you could use the OFF LINE key and the 25th line. That is, go off line and go to the 25th line; go on line and type FSPRINT; go off line and go to somewhere above the 24th line; and finally go back on line and type the return.

Sending the screen to disk

The program in Listing 3, FSDISK, copies the screen image to a disk file. The name of the disk file is typed on the command line just after the command FSDISK. Again (as in FSPRINT), the code from locations 100 to 12A is the same as the FS code to copy the screen to the buffer. Locations 138 through 19B are the code required to open the disk file in CP/M. The code in locations 1CA through 269 is that required to move the characters from the buffer to the disk buffer area maintained by CP/M.

In order to save disk space, the program does not move the trailing blanks at the end of each line to the disk buffer. This is done by looking ahead 80 displayable characters and then backing up to the first non-blank character. (See locations 22F through 247.) When looking ahead, the program maintains a flag indicating the status of reverse video (RVFLAG). This is because the trailing blanks are significant in reverse video and must be saved at the end of the line. That is the purpose of the code from locations 1ED through 214.

The subroutine at locations 26C through 29A does the actual move to the

How to Use: Zenith/Heath Computers, by Hal Glatzer

Introducing—the guide to your computer system! Written specifically for users, *Zenith/Heath Computers* is both an introduction to computing concepts for the novice and a reference tool for the expert. It also serves as a buying guide for new hardware and software. Clear presentations of technical information are supplemented with photographs and illustrations. This is not a complicated users manual!

Published in December 1982

S-A Design Books.

TABLE OF CONTENTS

INTRODUCTION.....	4	SOFTSTUFF GENERAL LEDGER II.....	65
CHAPTER 1—IN THE BEGINNING.....	6	SOFTSTUFF INVENTORY.....	66
THE HEATH H-8 COMPUTER.....	7	PEACHTREE SERIES 5.....	66
FURTHER DEVELOPMENTS.....	7	DATABASE MANAGEMENT SYSTEMS.....	67
THE H-9 TERMINAL.....	7	CONDOR SERIES 20 DBMS.....	69
THE ALL-IN-ONE H-89 COMPUTER.....	8	dbASE-II.....	70
THE HEATH-ZENITH CONNECTION.....	8	HIGH-LEVEL PROGRAMMING LANGUAGES.....	73
HOW THEY'RE BUILT.....	10	COMMUNICATIONS SOFTWARE.....	73
THE SOFTWARE DILEMMA.....	11	COMPUTERIZED PHONE SYSTEM.....	74
HEATH USERS RESPOND.....	12	MICRONET COMMUNICATIONS.....	74
HDOS AND CP/M.....	12	REACH—REMOTE TERMINAL EMULATOR.....	75
CURRENT SOFTWARE DEVELOPMENT.....	13	PROGRAMMING TOOLS.....	75
CHAPTER 2—HOW A COMPUTER WORKS.....	14	SPECIAL PURPOSE EDITORS.....	76
HOW IT WORKS.....	15	ED-A-SKETCH.....	77
THE HARDWARE.....	16	EDIT-19.....	78
SYSTEM AND APPLICATIONS SOFTWARE.....	17	WORD MASTER.....	79
RAM AND THE FLOPPY DISK.....	18	GAMES AND OTHER ACTIVITIES.....	80
TYPES OF INFORMATION.....	19	CHAPTER 7—EXPANSION AND UPGRADES.....	81
PUTTING IT ALL TOGETHER.....	21	MEMORY EXPANSION.....	81
CHAPTER 3—THE ALL-IN-ONE Z/H-89.....	22	INSTALLING THE 16-K RAM EXPANSION.....	82
THE Z/H-89 AND THE Z/H-90.....	22	DISK DRIVE UPGRADES.....	86
USING MORE THAN ONE DISK.....	23	ADDING A SECOND DRIVE.....	86
USING A Z/H-89.....	27	THE DOUBLE-DENSITY CONTROLLER.....	86
THE TERMINAL SECTION.....	27	INSTALLING THE Z/H-37 CONTROLLER.....	87
THE KEYS AND WHAT THEY DO.....	28	8-INCH FLOPPY DISKS.....	87
ESCAPE SEQUENCES.....	28	THE HARD DISK.....	87
CONTROL SEQUENCES.....	29	DISK UPGRADES FROM OTHER SOURCES.....	88
SPECIAL-FUNCTION KEYS.....	30	DATA COMPASS DISK DRIVES.....	89
OTHER COMMAND KEYS.....	30	MAGNOLIA MICROSYSTEMS DISK DRIVES.....	90
THE NUMERIC KEYPAD.....	33	OPERATING SYSTEM CONSIDERATIONS.....	91
COMPUTER COMMUNICATIONS.....	35	CONVENIENCE ENHANCEMENTS.....	91
REMOTE DATABASES.....	35	SOFTWARE SPOOLERS.....	92
THE ZENITH ZT-1.....	36	HARDWARE CUSTOMIZING.....	93
ELECTRONIC MAIL.....	36	INTERNAL CONFIGURATION SWITCHES.....	94
CHAPTER 4—THE 8-BIT/16-BIT Z/H-100.....	37	HARDWARE PRINTER SPOOLERS.....	95
SYSTEM CONFIGURATION.....	39	COMPOSITE VIDEO GENERATOR.....	95
THE CPU AND MEMORY.....	39	EXPANSION INTERFACE.....	96
RANDOM-ACCESS MEMORY.....	40	PRINTER INTERFACING.....	97
GRAPHICS.....	41	THE RS-232 CONNECTION.....	98
THE KEYBOARD.....	41	A UNIVERSAL HDOS DEVICE DRIVER.....	98
MASS STORAGE.....	43	HANDSHAKING LINES.....	99
INPUT/OUTPUT.....	43	LETTER-QUALITY PRINTERS.....	100
SYSTEM EXPANSION.....	44	THE QUME SPRINT 5/55.....	101
SOFTWARE.....	44	THE F10 STARWRITER.....	102
OPERATING SYSTEMS.....	45	DOT-MATRIX PRINTERS.....	105
APPLICATIONS SOFTWARE.....	45	THE Z/H-25.....	106
THE HEATH H-100 KIT.....	45	THE EPSON MX-80.....	107
CHAPTER 5—THE OPERATING SYSTEMS.....	46	THE SIEMENS 2712 INK-JET PRINTER.....	108
THE CHAIN OF COMMAND.....	46	SWITCHING RS-232 SERIAL PRINTERS.....	109
UTILITY PROGRAMS.....	46	INSTALLING AND USING A MODEM.....	110
HDOS.....	47	THE CAT ACOUSTIC-COUPLED MODEM.....	110
WORKING WITH HDOS.....	47	USING THE MODEM.....	111
CAT—THE HDOS FILE CATALOG.....	48	THE KESA DIRECT-CONNECT MODEM.....	112
FILE DESIGNATIONS.....	48	SOLVING INTERFACING PROBLEMS.....	112
ABOUT HDOS DISKS.....	49	CHAPTER 8—TROUBLESHOOTING & MAINTENANCE.....	112
INIT—DISK INITIALIZATION.....	49	THE SOURCES OF TROUBLE.....	113
SYSGEN—SYSTEM GENERATION.....	50	TOO WET.....	114
COPYING FILES.....	50	ZAP.....	115
MULTI-DRIVE HDOS SYSTEMS.....	51	POWER OUTAGE OR LOSS.....	116
PIP—THE MOST IMPORTANT UTILITY.....	51	POWER FLUCTUATIONS.....	117
ADDITIONAL HDOS COMMANDS.....	52	DISK DILEMMAS.....	117
CP/M.....	52	UNDERSTANDING THE TECHNOLOGY.....	117
WORKING WITH CP/M.....	53	BITS AND BYTES.....	119
COPYING CP/M AND COPYING FILES.....	54	BINARY NUMBERS.....	119
CP/M FILE DESIGNATIONS.....	55	SPLIT-OCTAL NUMBERS.....	120
HDOS AND CP/M COMPARED.....	55	MEMORY MAP.....	120
CHAPTER 6—APPLICATIONS SOFTWARE.....	56	MONITOR COMMANDS.....	121
SPREADSHEET PROGRAMS.....	57	DIAGNOSTIC TESTS.....	123
SUPERCALC.....	57	THE ASCII DISPLAY.....	125
ZENCALC.....	58	THE "WALKING-BIT" MEMORY TEST.....	126
WORD PROCESSING PROGRAMS.....	59	THE MOST COMMON HARDWARE PROBLEMS.....	128
FORMATTING.....	59	ADDITIONAL DIAGNOSTIC SOFTWARE.....	128
ELECTRONIC TYPING.....	59	CHAPTER 9—INDIVIDUAL ACCOMPLISHMENTS.....	128
MAGIC WAND.....	60	REAL ESTATE APPRAISALS.....	128
LITERAL FILE WORD PROCESSORS.....	60	HEARING TESTING.....	128
PIE.....	62	ATTORNEY'S OFFICE MANAGEMENT.....	128
TEXT PROCESSOR.....	62	DOCTOR'S PATIENT/PRACTICE MANAGEMENT.....	129
WORDSTAR.....	63	DOCTOR'S PATIENT/PRACTICE MANAGEMENT.....	129
PROOFREADING/ SPELLING PROGRAMS.....	63	HELPING THE BLIND TO READ.....	136
SPELLGUARD.....	64	UNDERSTANDING THE HUMAN VOICE.....	140
SPELLSTAR.....	64	CHAPTER 10—ASSEMBLING THE H-89 COMPUTER.....	140
WORD PLUS.....	64	ASSEMBLING THE H-25 PRINTER.....	142
SPELL.....	65	GLOSSARY.....	142
BUSINESS ACCOUNTING SOFTWARE.....	65	INDEX.....	142
		LIST OF SUPPLIERS.....	INSIDE BACK COVER

THIS IS AN INDEPENDENT PUBLICATION PRODUCED BY S-A DESIGN BOOKS AND IS NOT IN ANY WAY ASSOCIATED WITH THE HEATH OR ZENITH DATA SYSTEMS CORPORATIONS.

Order your copy of *Zenith/Heath Computers* today for \$19.95—including shipping and handling. If you're not completely satisfied with the book, just return it to us within 30 days for a full refund. Please indicate whether you would like us to ship the book by U.P.S. or Parcel Post, Special Handling. We can accept checks (in U.S. dollars, payable on a U.S. bank, please), money orders, Visa or MasterCard. To order, fill out the order card above and mail it with your payment of \$19.95 for each copy to:

Sextant Publishing Company, Dept. S9, 716 E Street S.E., Washington DC 20003 • 202/544-0900

disk buffer (also called the DMA in this program), and calls CP/M to do the write to disk if the buffer is full.

The program determines that the buffer is full by looking at the last byte of the buffer pointer. (See the code at locations 274 through 276.) If this is zero, then the buffer is full because the buffer starts at location 80H and is 128 bytes long. So the next byte just after the buffer is location 100H (the start of the program). We could, of course, have counted the characters in the buffer until the count hit 128. But it is easier to take advantage of the location of the buffer in this case.

And finally, the code at locations 2BA through 2D7 is the program ending. It places a CTRL-Z (1A in hexadecimal) in the buffer to indicate end-of-file to CP/M (locations 2BA through 2B0) and then fills the rest of the buffer with zeroes (locations 2C6 through 2C9). The program then writes out the last disk buffer, closes the file, and returns to CP/M.

Some notes on HDOS

If you wish to use this technique under HDOS, you should find the modifications relatively simple. In FS, you should only have to change the ORG command to ORG USRFWA, and change the JMP 0 command to SCALL .EXIT.

In FSPRINT, you will have to replace the BDOS calls (in addition to making the FS changes). To do so, you will have to add an SCALL to open the printer device driver at the beginning and one to close it at the end. Instead of writing the print characters to the printer one at a time, you will have to format a 256-byte print buffer by moving characters from BUFFER to it (inserting line feeds every 80). This logic is similar to that used in the program FSDISK to move the characters to the DMA area. In HDOS, the end of each line would be delimited by a line feed only, instead of both the carriage return and line feed required by CP/M. (See the HDOS System Programmer's Guide for more details.)

Actually, some device drivers will handle the data one character at a time; so you might try setting BC to 1 and using the same logic as FSPRINT. That is, you would issue an SCALL to write to the printer for each character. If you don't care about speed, you could try putting a single character in front of 255 nulls (zeroes) and use the FSPRINT logic. All device drivers I am familiar with will merely ignore the nulls.

To convert FSDISK, you would again have to create your own 256-byte buffer and move the characters to it instead of to the DMA. You would have to use the appropriate SCALLS instead of BDOS calls to OPEN, WRITE, and CLOSE the disk file. And you would get the file name directly instead of using the FCB defined on 005C.

0180 3C		INR	A	;SO ERR 255 NO FILE BECOMES ;ZERO
0181 C2CA01		JNZ	CONT	
0184 0E16		MVI	C,22	;MAKE FILE
0186 115C00		LXI	D,FCB	
0189 CD0500		CALL	BDOS	;FILE DOES NOT EXIST SO ;CREATE IT
018C 3C		INR	A	;ERR 255 NO ROOM IN DIR ;BECOMES ZERO
018D C2CA01		JNZ	CONT	
0190 119B01		LXI	D,NOSPACE	
0193 0E09		MVI	C,9	;PRINT
0195 CD0500		CALL	BDOS	;PRINT ERR MSG
0198 C30000		JMP	0	;GIVE UP
019B 4E4F20524FNOSPACE		DB	'NO ROOM ON DIRECTORY TO CREATE FILE - QUITTINGS'	
01CA 21E402	CONT:	LXI	H,BUFFER	
01CD 22DE02		SHLD	BPTRL	;POINT NEXT LINE TO START OF ;BUFFER
01D0 218000		LXI	H,DMA	
01D3 22E202		SHLD	DMAPTR	;SET DMAPTR TO START OF ;BUFFER
01D6 2ADE02	NEXTLN:	LHLD	BPTRL	
01D9 22E002		SHLD	BPTRM	;SET NEXT CHAR TO MOVE TO ;START OF LINE
01DC 3E0D		MVI	A,15Q	;CR?
01DE BE		CMP	M	
01DF CABA02		JZ	ENDLP	;IF CR THEN WE ARE DONE - ;CLEANUP
01E2 3E50		MVI	A,80	;# CHARS IN A LINE
01E4 32DC02		STA	COUNT	
01E7 32DB02		STA	CHK	
01EA 2ADE02	FNDLN:	LHLD	BPTRL	
01ED 3E1B		MVI	A,ESCAPE	
01EF BE		CMP	M	
01F0 C21702		JNZ	FNDLN2	
01F3 3ADC02		LDA	COUNT	
01F6 3C		INR	A	
01F7 3C		INR	A	
01F8 32DC02		STA	COUNT	;ADD 2 TO COUNT TO ALLOW FOR ;ESC SEQ
01FB 23		INX	H	
01FC 3E70		MVI	A,'p'	
01FE BE		CMP	M	
01FF C20A02		JNZ	FNDLN4	
0202 3E01		MVI	A,1	
0204 32DD02		STA	RVFLAG	;ESC p found so set reverse ;video flag
0207 C32802		JMP	FNDLN3	
020A 3E71	FNDLN4:	MVI	A,'q'	
020C BE		CMP	M	
020D C22802		JNZ	FNDLN3	
0210 AF		XRA	A	
0211 32DD02		STA	RVFLAG	;ESC q found so reset reverse ;video flag
0214 C32802		JMP	FNDLN3	
0217 23	FNDLN2:	INX	H	
0218 22DE02		SHLD	BPTRL	
021B 3ADB02		LDA	CHK	
021E 3D		DCR	A	
021F 32DB02		STA	CHK	
0222 CA2F02		JZ	BACKUP	;AT END OF LINE BACKOFF FOR ;BLANKS
0225 C3EA01		JMP	FNDLN	
0228 23	FNDLN3:	INX	H	
0229 22DE02		SHLD	BPTRL	
022C C3EA01		JMP	FNDLN	
022F 3ADD02	BACKUP:	LDA	RVFLAG	
0232 B7		ORA	A	;OR A WITH ITSELF JUST TO SET ;ZERO FLAG
0233 C24A02		JNZ	DISKIT	;RV IN PROGRESS SO EVEN ;BLANKS COUNT
0236 2B		DCX	H	
0237 3E20		MVI	A,' '	
0239 BE		CMP	M	
023A C24A02		JNZ	DISKIT	;LAST NON-BLANK FOUND
023D 3ADC02		LDA	COUNT	
0240 3D		DCR	A	
0241 32DC02		STA	COUNT	
0244 CA5F02		JZ	CRLF	;NO NON-BLANKS SO JUST PUT ;OUT CR LF
0247 C32F02		JMP	BACKUP	
024A 2AE002	DISKIT:	LHLD	BPTRM	
024D 7E		MOV	A,M	
024E 23		INX	H	
024F 22E002		SHLD	BPTRM	
0252 CD6C02		CALL	DISKOUT	
0255 3ADC02		LDA	COUNT	


```

0258 3D          DCR      A
0259 32DC02      STA      COUNT
025C C24A02      JNZ      DISKIT
025F 3E0D        CRLF:    MVI      A,15Q      ;CARRIAGE RETURN
0261 CD6C02      CALL     DISKOUT
0264 3E0A        MVI      A,0AH      ;LINE FEED
0266 CD6C02      CALL     DISKOUT
0269 C3D601      JMP      NEXTLN

;
;          DISKOUT - SUBROUTINE MOVES A REG TO BUFFER
;                  & WRITE TO DISK IF NECESSARY
;
026C 2AE202      DISKOUT  LHLD     DMAPTR
026F 77          MOV      M,A
0270 23          INX      H
0271 22E202      SHLD     DMAPTR
0274 AF          XRA      A
0275 BD          CMP      L
0276 C0          RNZ          ;NOT TO END OF BUFFER YET
0277 218000      TODISK   LXI      H,DMA
027A 22E202      SHLD     DMAPTR ;RESET DMAPTR TO BEGINNING
027D 0E15        MVI      C,21      ;WRITE SEQUENTIAL
027F 115C00      LXI      D,FCB
0282 CD0500      CALL     BDOS
0285 B7          ORA      A          ;SET ZERO FLAG
0286 C8          RZ          ;GOOD WRITE
0287 0E09        MVI      C,9        ;PRINT
0289 119A02      LXI      D,NOROOM
028C CD0500      CALL     BDOS ;WRITE ERROR MSG NO MORE
;ROOM ON DISK ETC
028F 0E10        MVI      C,16      ;CLOSE
0291 115C00      LXI      D,FCB
0294 CD0500      CALL     BDOS ;SAVE WHAT WE GOT
0297 C30000      JMP      0          ;QUIT
029A 4E4F204D4FNOROOM DB      'NO MORE ROOM ON DISK - QUITTING$'

;
;          END OF DISKOUT SUB
;
02BA 2AE202      ENDL:    LHLD     DMAPTR
02BD 3E1A        MVI      A,1AH      ;CTL-Z MEANING END OF FILE
02BF 77          MOV      M,A
02C0 23          INX      H
02C1 AF          XRA      A
02C2 BD          CMP      L
02C3 CACC02      JZ       ENDFL
02C6 77          FILLZ:   MOV      M,A      ;LOOP TO FILL BUFFER WITH ZEROES
02C7 23          INX      H
02C8 BD          CMP      L
02C9 C2C602      JNZ      FILLZ
02CC CD7702      ENDFL    CALL     TODISK ;WRITE OUT THE PADDED RECORD
02CF 0E10        MVI      C,16      ;CLOSE
02D1 115C00      LXI      D,FCB
02D4 CD0500      CALL     BDOS ;CLOSE FILE
02D7 C30000      JMP      0          ;HAPPY ENDING

;
02DA          INT      DS      1
02DB 50          CHK      DB      80      ;# CHARACTERS TO CHECK FOR A PRINT LINE
02DC 50          COUNT   DB      80      ;# CHARACTERS IN A PRINT LINE
02DD 00          RVFLAG   DB      0      ;1 IF RV ESC IN PROGRESS 0 OTHERWISE
02DE          BPTL      DS      2      ;BUFFER NEXT LINE POINTER
02E0          BPTM      DS      2      ;BUFFER NEXT CHAR TO MOVE/WRITE
02E2          DMAPTR    DS      2      ;NEXT LOC IN DMA FOR MOVE
02E4          BUFFER    DS      5640
18EC          END      START

```

And finally . . .

This is the end of the promised programs. I did mention some other uses for the screen image in the beginning of the article. To make a print routine driven by a special function key, you would have to attach the program to the operating system. Then, whenever the special key you had selected was pressed, you would copy the screen as in the example programs. To make a simple one-screen editor, you would need code at the beginning of your program to echo what is typed on the keyboard to the screen, until the special key you had selected was pressed. You would then save the screen to disk or print it as in the example programs.

I have available for \$7.95 an rs program for HDOS which will copy the screen to disk and/or printer. If you mention this article, I'll include the source code. It is in Z80 mnemonics for the Microsoft M80 assembler, unfortunately. So it is not exactly the same as in the listings here. Also, it cannot be assembled with ASM, which comes with HDOS.

This program has a couple of nice extra features for print control and storage format. I and my children have found it quite useful. My children use it as a general-purpose text editor. They can't type well enough to last for more than a screen, anyway. I have used it to save the screen when testing and to prepare patch listings. It can optionally store the disk file in a format compatible with the Ed-A-Sketch graphics editor from The Software Toolworks. And I have used it to modify the maze on their Munchkin game.

Ordering Information

HDOS screen-dump programs, \$7.95
Available only in 5¼" hard-sectored, single-density HDOS format.

Mention this article to request inclusion of source code in Z80 mnemonics for Microsoft M80 assembler.

Siebert Ickler

P.O. Box 1571

Corpus Christi, TX 78403

Sextant Back Issues are Still Available!

Don't miss out on information about your Heath/Zenith system.

Order your Sextant back issues today!

Send me:

- Premiere Issue—including "A Parallel Interface for the '89", and "Disk Programming Without HDOS".
- Issue #2—including "Crucial Secrets of HDOS", and a Z100 preview.
- Issue #3—including "The World's Fastest Sort?"
- Issue #4—including "Interrupt Programming Under HDOS".
- Issue #5—including "CP/M: The First 13 System Calls".
- Issue #6—including "Pascal Elucidated" and assembly language "Inside A Spooler".
- Issue #7—including a roundup of over 80 software products for the Z100.
- Issue #8—including a roundup of nearly 50 games for Heath/Zenith computers.

@ \$3.50/issue* = \$ _____

☐ Payment enclosed. (Checks must be in U.S. dollars payable on a U.S. bank.)

☐ Charge my: ☐ Visa ☐ MasterCard (MC code # _____)

Card # _____ Expires _____

Issues will be sent by first class mail upon receipt of payment.

Name _____

Address _____

Clip this coupon and send it today to:

Sextant, Dept. S9, 716 E Street S.E., Washington, DC 20003

*Please include \$3 additional for each issue to be mailed overseas.

HOME FINANCE SYSTEM VERSION 2

—An extensive Home Finance System that keeps track of checking, asset accounts (cash, savings, IRAs, CDs), and regular bill payments. Let your printer write your checks for you on **any** business-sized check (design your own check format).
—Checks have user defined codes and a separate flag for tax deductible items.
—Many reports, including listing all checks, or checks by codes or tax flag.
—System consists of 100 page users manual with 5 program disks (5-1/4") and a sample data disk.

Hardware: H8/H19 or H-Z89/90 with 64K RAM and two disk drives. Printer strongly recommended (any Heath[®], Zenith[®] or other printer).

Software: HDOS 2.0 and Microsoft[®] MBASIC 4.82 for HDOS. —Complete system: \$89† (specify hard-soft sector 5-1/4", or 8"). Manual alone \$21†.

Master Card/Visa accepted, please include your phone number.

Jay H. Gold, M.D.
Jay Gold Software
Box 2024, Des Moines, IA 50310
(515) 279-9821 †Prices include shipping.

Circle #120 on Reader Service Card

PROTECT and BEAUTIFY your computer with *Quality and Attractive* COMPUTER COVERS

- * These simulated leather vinyl covers protect your computers, disk drives, and printers from ever present dust, liquid spills, pet hairs and smoke during the hours your components are not in use.
- * They will coordinate and enhance your room's decor. Available in Colonial Blue, Woodtone Brown, and Textured Black.
- * Avoid losing vital information and costly maintenance calls or down time.
- * Recommended by all manufacturers.
- * Made of heavy honeycomb backed vinyl with a handy self loop for hanging.

RESPOND TODAY

Qty.	Description	Text. Black	Wood. Brown	Colon. Blue	
	H/Z19,H/Z89,H/Z90				\$25@ \$.00
	H/Z100 Vert.Disk Dr				\$30@ \$.00
	H/Z100 Hort.Disk Dr				\$30@ \$.00
	Dbl Cabinet. Disk Dr				\$20@ \$.00
	Epson MX80,FX80				\$20@ \$.00
	Epson MX100,FX100				\$30@ \$.00
Total Cover Costs					\$.00
Postage \$1.50 for one cover, \$1.00 for each addtl					\$.00
Ohio Residents add 6.5% sales tax					\$.00
Total Amount Enclosed					\$.00

REQUEST cover INFORMATION for other brands or equipment

Send Check or Money Order to

COMPUTER COVERS

P.O.Box 551 dept SX, Chagrin Falls, OH. 44022

Workmanship Guaranteed. Dealer and Quantity Enquiries Welcome.

Circle #115 on Reader Service Card

Z 100 Lightpen

THE FIRST 100% COMPATIBLE H100/Z100 LIGHTPEN!
Plugs right into the back of the computer without modification.
Comes with six foot coiled cord, chrome barrel, and instructions.
\$150.00

Software support for the above is contained within PALETTE, available as a separate item for \$69.95. Both items available at most Heathkit Electronic Centers, many ZDS Dealers, and direct from Software Wizardry. Please add 2% shipping (\$2 minimum) plus sales tax in Missouri. MasterCard and Visa accepted.

Software Wizardry

THE MAGIC TOUCH

122 Yankee Drive
St. Charles, MO 63301
(314) 946-1968

More on HDOS Stand-Alone

Squeeze more disk space from HDOS—automatically.

Charles E. Cohn

In *Sextant* #6, I described how users of the Heath Disk Operating System (HDOS) could get more usable disk space through stand-alone operation.

Stand-alone is an undocumented feature of HDOS. Briefly, it involves booting up with a standard disk containing all system files, and then switching (RESETTING) to a working disk which only needs to have SYSCMD.SYS and PIP.ABS on it. This is particularly valuable for those with a single-drive system, but multi-drive users will also find it useful. (For more, see "Squeeze More Disk Space Out of HDOS," Summer 1983. By the way, this article was followed up by some excellent comments from Jack McKay of Washington, D.C., in the letters column of *Sextant* #7, Fall 1983.)

A drawback to stand-alone as I described it is that it is necessary—every time you boot up—to type in commands to load your device drivers, as well as the command SET HDOS STAND-ALONE. All that typing gets old after a while.

Fortunately, it is possible to eliminate this minor inconvenience by use of another undocumented feature of HDOS. Whenever HDOS is booted up, it tries to execute a program named PROLOGUE.SYS. If a program with that name is on the system disk, control will pass to it immediately. If it is not present, control will pass directly to the command processor.

Listing 1 will eliminate the typing. All you will have to do is to boot up with your system disk and put in the date. Within a few seconds, the computer will tell you to change to your working disk.

Using the program

To use the program, first assemble it, and name the resulting object-code program PROLOGUE.SYS. Then put it on your boot-up disk. You may have to customize the program for your system. If you don't have a printer, for instance, you should delete the coding that loads the printer driver. If, on the other hand, you have drivers for other peripherals (except SY:, which is always resident), put in analogous coding to load them.

(But what about those times when you don't want to go into stand-alone mode on boot-up? You may want to do something with the boot-up disk instead. You can manage that by using still another undocumented feature of HDOS. When the computer says ACTION <BOOT>, type I (for Ignore). HDOS will

```
* Prologue to set up stand-alone operation
XTEXT  HOSDEF
XTEXT  HOSEQU
ORG     USERFWA
START  EQU      *
*Load the line printer driver (omit if no line printer)
LXI     H,LPNAME
SCALL   .LOADD
JC      ERROR
*Repeat the above for any other device drivers (except SY:)
*Load the overlays
MVI     A,0                      Load overlay 0
SCALL   .LOADO
JC      ERROR
MVI     A,1                      Load overlay 1
SCALL   .LOADO
JC      ERROR
*Clear channel -1, which the boot process leaves open
MVI     A,-1
SCALL   .CLEAR
JC      ERROR
*Now change disks
LXI     H,SYNAME
SCALL   .RESET
JC      ERROR
*Finally, pass control to SYSCMD.SYS on new disk
MVI     A,0                      Normal exit
SCALL   .EXIT
*Error handler
ERROR   MVI     H,70
SCALL   .ERROR
MVI     A,1                      Abort exit
SCALL   .EXIT
LPNAME  DB      'LP:',0
SYNAME  DB      'SY0:',0
END     START
```

Listing 1: Assembled, this program should be named PROLOGUE.SYS and placed on your boot disk. It will install HDOS STAND-ALONE automatically upon boot-up.

then not look for PROLOGUE.SYS, but will go directly to the command processor as soon as the boot is complete.)

One of the things you might want to do under stand-alone might be copying files with ONECOPY. It is helpful to be in stand-alone mode when using this utility. This allows you to return to normal operation when you are through instead of having to reboot. All you have to do is see that a disk containing SYSCMD.SYS is in place when you hit Control-D to get out of ONECOPY. If your source disk has nothing but data files on it, use the /MOU command to put in your boot-up disk before exiting ONECOPY.

If ONECOPY is on your boot-up disk, it is probably easier to let the prologue set up the stand-alone operation and then momentarily remove and re-insert the disk than to type in the stand-alone setup commands yourself.

IMPROVED CP/M® TO ATARI® INTERFACE! The Critical Connection™ ONLY \$175

- ★ Automatic install in many systems
- ★ Hardware connects Atari to CP/M system
- ★ Software allows Atari to use disk drives, printer and keyboard of the CP/M system.
- ★ Ability to simulate, with the CP/M system, 4 Atari disk drives simultaneously.
- ★ Software buffers your keyboard & your printer.

The Critical Connection™ received 3 ratings of "excellent" in the Sept. 26, 1983, InfoWorld review.

(408) 997-0264

USS ENTERPRISES

6708 Landerwood, San Jose, CA 95120
Call/Write for Free Brochure

Circle #225 on Reader Service Card



INCREASE YOUR IN-CABINET STORAGE CAPACITY

With The Original Storage Multiplier Units

Slip out your old 125K byte drive and slip in one of our Disk Storage Multiplier units. Our DSM units will increase your floppy storage by at least four times by using high speed, low power, double sided drives. Each DSM kit is complete with software, labelled drives (fully checked out), all cabling and hardware, and documentation. Your choice of HDOS or Heath's CP/M software is included - software for the other operating system is only \$35 extra. Soft sector only operation requires no software. Our idea has been copied, but no one has copied our quality and customer support.

DSM capacities - multiples of the 125K drive:

	DSM 4000	DSM 6000	DSM 8000
Hard Sector only	4X \$590	6X \$660	8X \$720
Soft Sector only	8X \$565	12X \$635	16X \$695

We carry the Z-89-37 soft sector controller for \$260.00

Group purchase discounts available. Shipping is postpaid in the continental U.S. Others please add 5%; excess will be refunded. VA residents please 4% tax.

H&H COMPUTER ENTERPRISES, INC.
P.O. Drawer H Blacksburg, VA 24060
(703) 552-0599

Circle #126 on Reader Service Card

QBD

HELP FOR DECISION MAKERS
BUSINESSMEN • HOMEMAKERS • STUDENTS

QBD IS A DECISION SUPPORT SYSTEM THAT USES
MANY OF THE QUANTITATIVE TECHNIQUES TAUGHT
IN BUSINESS SCHOOLS.

ONLY **\$49.⁹⁵** Requires MBasic

PICK'EM

PREDICTS NFL GAMES COMPLETE WITH POINT
SPREADS.

EASY TO USE ONLY **\$19.⁹⁵**

**BOTH PROGRAMS REQUIRE H/Z - 89,
H-8/H-19 OR Z 100 - SERIES**

SPECIFY DISK FORMAT AND HDOS OR CP/M.
Add \$2.00 S/H per order
(CA residents add appropriate sales tax)



STUART SOFTWARE
25381-G ALICIA PARKWAY
SUITE 316
LAGUNA HILLS, CA 92653
(714) 855-4753



Circle #169 on Reader Service Card

Z-100

CP/M Emulator for Z-DOS

- Allows CP/M Programs to Run Under Z-DOS
- Eliminates the Need for 2 Operating Systems:
 - All programs run under Z-DOS
 - All files are on Z-DOS diskettes
- Easy to Set Up
- Easy to Use with Single Command
- Requires Z-100 with 128K Ram
- Diskette with Documentation \$50—Postpaid

ABARIS, INC.
11204 Tack House Court
Potomac, MD 20854

Circle #101 on Reader Service Card

Guide to Writing for *Sextant*

In which our inimitable technical editor offers some hints on style and content.

John Walker

Have you thought of writing about your computer? About what you do with it, and how?

Sitting there at home, you may figure that most people who write about computers are professionals: either computer professionals or professional writers. Well, while professionals do account for a lot of writing, a lot more is done by people who only consider themselves users or hobbyists. Their knowledge—and yours—is no less valuable because it focuses on one area. The problem you found challenging or fun may be tying someone else in knots. The program you've learned to use to its fullest may not have been reviewed yet.

Whether you're a hobbyist, a writer, a programmer, or a hardware specialist, you may very well be carrying around the idea for an article for *Sextant*. To get your knowledge to our readers, you mainly need: 1) a Heath/Zenith computer; and 2) a willingness to write about it.

What is *Sextant*?

Sextant is the independent magazine for the entire Heath/Zenith computer community and for users of Heath/Zenith-compatible computers.

We're one of a growing number of magazines dedicated to covering a single brand of computer, its activities, and the applications of its equipment. We report on Heath/Zenith, we evaluate them, we show how their equipment and services can be put to work in consumer, recreational, educational, and business applications.

We also report on the entire industry that has grown up around the Heath/Zenith computers. This includes the producers of hardware add-ons. We cover the software, too. We cover all the products that are produced by independent suppliers to the Heath/Zenith community. Some of these companies have grown to the point where they're producing complete computers on their own. Since those computers are compatible with Heath/Zenith computers, we cover them, too. And we'll also include any new companies that produce similarly compatible equipment and computers.

So it's important to remember that we're an independent magazine. We're not employed by Heath/Zenith. We're paid by thousands of readers and dozens of advertisers. No one firm provides more than 2% of the gross income of

Sextant Publishing Company. We can call the shots as we see them.

We're descended from *Buss: The Independent Newsletter of Heath Co. Computers*. Started in 1977, it's arguably the oldest independent system-specific newsletter in the microcomputer industry. *Buss* has become an indispensable support tool for users of Heathkit and Zenith computers. On the chance that you're new to this, by the way, they're the same computers: if you buy them assembled, they bear the Zenith Data Systems label. Put together from a kit, they'll have the Heath Company logo.

That Heathkit connection is important for *Sextant* and has been even more important for *Buss*: people who build their computers want to know a lot about them and their applications. Some *Buss* readers get involved with all the circuitry, details, and fine print of their equipment and software. Others want to keep up on the latest products available. For whatever reason, they tend to have a high degree of interest and involvement with their computers.

Who reads *Sextant*?

With *Sextant*, we've moved into the field of those who are primarily concerned with *applications*. More and more, there are readers who know how to use their Heath/Zenith computers in a particular context and are seeking to expand their use and move into other areas. But they have more of an eye to getting a job done economically, rather than experimenting with their machines' potential just for the challenge of it or because they intend to be computer professionals.

This does not mean *Sextant* will ignore computer enthusiasts and professionals. Nor, for that matter, will *Sextant* duplicate or replace *Buss*. The major differences between them are those that are inherent to each medium. A magazine can cover issues at more length and in more depth than a newsletter can. A newsletter can give more quick announcements and act as a "party line" among readers. Depending on their level of knowledge and involvement, many readers will find it advisable to subscribe to both. In fact, the writers for *Sextant* are frequently readers of *Buss*. They write articles both for the new user and for others at their own level. They all need in-depth product reviews. They all want to know how their computers can be used more effec-

tively. And they all like to know they have a source of detailed technical material that goes deeper than they need right now. *Sextant* has to cover the whole spectrum.

The substance of a *Sextant* article **What does *Sextant* want articles about?**

Anything *specific* to Heath/Zenith equipment and users. Hardware, software, applications, your experiences with all the above, and all the possible interrelations. Practically anything is grist for the mill.

The key is that the article should show something users or prospective users can do with their equipment. That does not mean an exclusive concern with the latest software. But we do figure that our readers have a "show me" attitude. If it's an article on how to beef up your hardware, it should show who would benefit from the increased potential. If it's an article on some technically interesting feature, it could show why it's good to be aware of it, even if you have no need for it right now. People can grow into a need for certain knowledge. And part of the job of a magazine like *Sextant* is to keep them informed about what they'll run into down the road.

We're interested in general news and information articles, too. But they need a Heath/Zenith slant. If it's an article just on telecommunications, say, we probably can't use it. But if it's about someone's using Heath/Zenith equipment or related software to do the work, *we want to see it*.

Well, since you raised the point, what do you not want articles about?

Maybe we shouldn't have raised the point. If in doubt, *send it*.

But really, the main limitation concerns articles that do not refer to Heath/Zenith equipment, users, or applications. We figure our readers can get general information elsewhere. The general press covers general concerns well enough. But there's a lack of readily available information about Heath/Zenith in the general computer press. That's the gap we fill.

But, since we've opened that can of worms, and since writers do well to know of editors' prejudices, we *have* found that certain articles seem *harder to write* than others.

1. "My first six months with my computer" (or any other product). Here, the

problem is that it's too easy to get snowed under by your own experience. It becomes difficult to universalize it to be of use to someone else who's just starting out. At the other extreme, it becomes too easy just to give general information that could be gained from any user or sales brochure.

2. "Putting in the 235A/4 framis in place of the Z440 widget." You might want to write such an article because you had to learn the little monster pin by pin and want to spare others the grief. But how many others will want to pick up the 235A/4 at their local World War I surplus store? It must have some relevance to a fair number of readers. Remember, though, that lots of times, your wacko idea *may* have wide relevance, so see *Style*, below, to avoid some of the pitfalls of over-specialization.

3. "Here's a real good word processing program" or accounting program or what not, for you to type into your computer. The problem here is that the program you would most likely write yourself has probably attracted other people's attention, too. And been put up for sale. So readers come to your offering with a lot of heavy competition in mind. Too many of our readers are willing to pay for the convenience and reliability of purchasing a well-regarded program available on disk. Typing in a few hundred lines grows old, fast.

What sort of programs are you looking for?

Basically, games and utilities. They should be relatively brief and of general interest. We're looking for things that people do "to" their computers, rather than "with" them.

So we've had to turn away some very nice programs. This is because of our need to keep things specific to our readers. An energy-audit program, for instance, may be outstanding, but not

everyone owns their home. We can presume, though, that everyone has a computer. So we stick to things that, theoretically, all our readers can use.

Do you only take short programs?

Yes and no.

If the main point of the article is just the program itself, then it should be kept

There's a lack of readily available information about Heath/Zenith in the general computer press. That's the gap we fill.

short. In BASIC, 150 lines is a pretty good warning point that you're getting on the long side.

But we *will* take much longer programs.

With longer programs, though, the goal is not just to type the program into your computer to have a nice game or utility. With longer programs, the article has to be much more educational, so that readers learn about programming, or about some particular kind of software. The program is the example, the illustration, not the main attraction.

Submitting to Sextant

How developed should my article be before I submit it to Sextant?

That's up to you. We'll consider submissions at practically any level of development.

Query: just a letter asking us if we'd be interested in a given idea.

Abstract: a few paragraphs giving the

basic points of the article.

Outline: the same information as an abstract, but it allows inclusion of smaller points without using up a lot of space. In general, we prefer "sentence-structure" outlines instead of "subject-heading" outlines. We need a sense of what you're going to say. So, "It's really hard" is better than "Relative Difficulty."

Rough: this could almost be a finished article, but you could leave out parts you're still working on, parts that need further research, or parts that you want our input on. Make sure to note such places clearly, though. Charts, illustrations, etc., could be rough sketches or photocopies or contact sheets.

Final: everything neat, tidy, and complete, including charts and illustrations in camera-ready form with captions.

Which is better?

That's for you to decide: which is better for *you*? If you have a number of ideas you're playing with and you're trying to decide, then a query, abstract, or outline would be best. If you really want to write about something in particular, and you're going to keep on trying until you get published, then a rough or final might be better.

The main difference for you will be in the timing: the closer it is to final form, then the quicker we can give you a firm answer; and, if we accept it, the sooner we can get it into print. But we hope to be around for a little while and we hope you will be, too. So putting an article off for an issue or two shouldn't be any crisis.

Of course, the earlier it gets printed, the earlier you get *paid*: how important that is, is also up to you. Starting out with a query may take a little time. But rewriting a rejected final also takes time. *Handle it in a way you find comfortable. In what form should it be?*

Ideally, printed matter should be sent on plain white paper, 8½" by 11",

YOU NEED THE GRAY BOX

to protect your computer system and software from harmful power line disturbances (voltage spikes/surges and losing power (line dropout).

The GRAY BOX is available in three models:

- GB-1 surge/spike protection \$39.95
- GB-2 line dropout protection \$59.95
- GB-3 both of the above \$69.95

Line isolation is available for any of the above models. Just add \$19.95 to the price of the model you want and the code "I" to the model number.



Send check or money order (no CODs or charges) to
KCSS (KANDUEAZY COMPUTER SOFTWARE SERVICES), 6218 Blossom Lane,
Alexandria, VA 22310, (703) 922-9450. Please include \$2.50 for
shipping and handling. Virginia residents add 4% sales tax.
ALL ZENITH DATA SYSTEMS PRODUCTS AT 10-25% DISCOUNT. FREE CATALOGUE



STRUCTURED PROGRAMMING

makes the task of designing and coding assembly language programs much easier; particularly with STRUCTUR. STRUCTUR converts the following structures (IF, DO, LOOP, CASE, etc.) into actual 8080 assembly language instructions freeing one to concentrate on program design rather than program mechanics.

STRUCTUR requires CPM. It is available in either hard or soft sector (48 tpi) formats for only \$39.95 and comes with a 50+ page users manual. The users manual is available separately for \$15.

double spaced, with 1" margins. Please don't send text, on *either* paper or disk, that's been right-justified, with extra spaces added to make all the lines the same length. If we accept the article, we'll only have to take them out. Nor should copy be all uppercase. It's hard to read and if accepted, we'd have to work on it to make it upper- and lowercase.

However, we're not dogmatic. As long as we can read it, we'll do so and at least give you some feedback on it. It's perfectly all right, for instance, to send in an article run out on fan-fold computer paper, without any form feeds at the folds.

Do I need to include a disk with my initial submission?

No. Generally, you need only send in the article on paper. The disk copy can be kept at home. It's only necessary to send it in when an article has been accepted.

The one exception to that rule is when you're submitting a short program where the program itself is the heart of the article. Then it has to be on disk. This is the only practical way we can test and evaluate the program. (Yes, we *do*.)

But you should have the disk copy in reserve. It makes copy editing infinitely easier than otherwise. And we use computer typesetting that reads the copy from disk.

What disk formats can you read? What word processor formats?

Practically any format that can be produced on a Heath/Zenith computer. If you have an H8 or H/Z89, we have a slight preference for HDOS over CP/M; on the H/Z100, a slight preference for Z-DOS over CP/M.

The only disk formats we have problems with are: 80 track/96 tracks per inch (under any operating system at all); and 5¼" soft-sectored HDOS. Also, if you have an H11, that can be a problem. But *never* hold back from submitting an article because you don't have it on an "approved" disk format. We can usually find ways to get around limitations.

Similarly, we can handle practically anything your word processor can turn out—although we do have our preferences. If it's feasible, we prefer ASCII-only text files without any control characters. On screen, the file should look just like it does on paper. Some word processors (such as WordStar) set the high bit of the last character of every word, others put in control characters instead of carriage returns. We only have to take that stuff out so as not to confuse our typesetter.

As always, however, submit first and worry about technicalities later.

What about illustrations?

First, consider your article's potential for illustrations (even if you don't think it has any). For a product review, for instance, you might be able to get hold of a company's press photos. Even photos

of disks and documentation can be useful.

If it's at all possible, photos, wiring diagrams, charts, etc., should be camera-ready. We have a limited arts-department capability, so it will help if you can produce "finished" graphics: india ink or other crisp black ink on white copy for drawings, etc.; large black and white glossies for photographs (8" x 10" glossies reduce well for printing purposes); or color slides. If in doubt, talk it over with us.

And if you use anyone else's material, *tell us*. Preferably, you should check with them, first. Most of the things you want to use (equipment pictures or schematics, say) are probably owned by folks who'd be glad to have them reproduced with credit. But copyrights are still copyrights and have to be checked long before deadline.

(Again, don't let that get in the way of submitting the article.)

Submitting an article to more than one publisher

What if I'm submitting my article to someone else as well as Sextant?

Tell us. And tell them. You *must* let people know if an article is being looked at by another publisher. In publishing, it's a major no-no to publish something that's appearing someplace else *without both publishers' agreement*. What a writer usually sells is "first-time" publishing rights. And that "first-time" is what gives the work a lot of its value. Some publishers flatly refuse to republish something that has appeared elsewhere.

Sextant, however, has no hard and fast rules against considering an article submitted elsewhere. But joint publication and republication have to have the other guy's permission. Copyright problems aside, however, *Sextant* will only republish an article if there's little chance our readers saw the first printing. So choose where you want it printed most, and submit there first. Most publishers respond quickly enough that you don't need to sit around forever waiting for a yes or no. If you do sit around waiting, *check*. If needs be, drop a note to them withdrawing the submission.

What if you're the ones taking all the time?

Er... well, it does happen. If it seems as if we're taking a long time, feel free to drop a note or to call us on the phone. (Ask for John Walker, the technical editor. He's probably the culprit.)

Payment

How much do you pay?

We pay at or above the market rate for computer-oriented publications: from \$50 to \$100 per *Sextant* page of printed copy. Of course, that's a rough figure. It can be affected by a number of factors. You can't just pull out a ruler to check

how much you were paid per page. Listings and tables get paid toward the low end. Actual text gets paid more. If your article took a lot more editorial work here at *Sextant*, that's going to lower the rate. Some writers will get paid more or less just depending on how great we think the subject, the writing, and the timeliness.

When will I get paid?

In the past (and currently), you would get paid *after* publication. Typically, you'd get two or three checks. The first would be the largest, going down from there. If you're a professional writer, you'll realize that's not typical in the publishing industry. We've done it that way for a couple of reasons.

First, it lets our editor sit down with an issue and go over all the articles at leisure. An article can be judged in the light of everything it contributes to that issue. Moreover, all the work is done: editing, corrections, production, graphics, last minute changes you noticed had to be made, and everything else that could happen.

Next, we have time to see what our readers think, through reader service cards, letters to the editor, and phone calls.

Of course, another reason for stretching out the payments has been good old *cash flow*. Frankly, we hope to be able to change things.

We expect to adopt a policy whereby you'll receive a small check as soon as the final version has been sent to the

**When it comes to quality software
for microsystems, DYNACOMP delivers:**



PERSONAL FINANCE SYSTEM: \$39.95

The Systems ... Apple Atari Canon Commodore
Comstar CP/M Franklin H/Z-100
IBM PC Kaypro Morrow NEC North Star
Osborne SuperBrain Timex TRS-80

The Software ...

ADVENTURE	BUSINESS	CARD GAMES	EDUCATION
ENGINEERING	GAMES	HOME FINANCE	INVESTING
LANGUAGES	SCIENCE	TAX PLANNING	UTILITIES

Name brand diskettes: \$19.95/10 (SS, SD w/hub ring).
Includes FREE plastic storage box. Add \$2.00 shipping.

CALL OR WRITE FOR A FREE CATALOG
DYNACOMP, INC.
1427 Monroe Avenue, Rochester, N.Y. 14618
Telephone: (716) 442-8960

typesetter; then the balance would follow upon publication.

Can I make arrangements for earlier payment?

Yes. If you want, we can settle on a price upon acceptance and pay immediately upon publication. In general, though, you'll get *less* than you would if you were willing to put up with our current, home-grown way of handling things. That's no guarantee, though. And we can understand that a professional writer, for instance, may prefer less money now to more later. We're assuming that most of our writers are writing as a sideline and the extra wait will be no real inconvenience. In any event, feel free to raise the question.

The goal, after all, is the same for all of us: the more you can offer us, the more we can offer our readers, and then the more we can offer you. It can be a very productive circle.

Style

What are your standards for grammar, punctuation, etc.?

Be careful. But don't get ulcers. Quite frankly, each magazine seems to accumulate its own little pet peeves. We have ours, too. But some of the industry's most cherished pets are little more than arbitrary dictates with no rhyme or reason to them. The rules for combining quotation marks with punctuation marks, for instance, were invented by typesetters on the basis of what they

thought looked pretty. (Like I said, we all have our pet peeves.)

The chief punctuation rule is: does it aid in understanding the sentence? Write as you speak, more or less; so that commas indicate a pause; periods indicate moving to a new thought; paragraphs go to a new subject; and so on.

Don't let your sentences run on forever. The active voice is usually better than the passive. Sentences should be shorter than paragraphs—and paragraphs shorter than pages. A page of solid print is death.

Are there more important matters of style than just grammar, etc.?

You bet there are. Ideally, articles for *Sextant* should be written in such a way as to be interesting to the advanced reader, but still accessible to the beginner. And this affects the substance of articles. The four most important points concern remembering your audience: people with a show-me attitude who hope to put your ideas to work in their own environment.

1. Justify yourself.

Each article for *Sextant* should clearly indicate *why* a reader should bother to read the article. What good will something do? For whom?

2. Universalize your experience.

Try to figure out who can benefit from your article—and how. Don't think merely in the usual terms of business, consumer, hobbyist, etc. Think also in terms of people who can use a given

capability. Some hobbyists are playing with communications networks similar to those used by giant corporations. Some consumers have bookkeeping needs more complicated than some small businesses. *Don't rule an audience out of consideration.*

3. Concretize your examples.

Don't be afraid to give concrete examples—particularly of the type that will be found in a variety of environments. "Human interest" and "human engineering" are often close cousins. The way it actually happened on your project may add a lot of life to a rule of practice you discovered or put to work.

4. Explain yourself—gracefully.

It may seem like a trivial rule, but it's an important one: always spell out on first writing. Whether it's "AT&T" or "RAM" or "AFRTS" or "NATO" or "ATC". The fact that everyone who reads *Billboard* will recognize the National Association of Theater Owners is irrelevant. Or that readers of the conservation press will recognize the Appalachian Trail Conference.

For more complex terms or for equipment, a similar attitude should prevail. You can't explain everything, but you can briefly indicate what you're talking about when you use a term. "The industry is agog over Heath's framis. It has established itself as the most advanced widget smasher around."

This explanatory material should appear in the *introduction* to the article, by

FORTTRAN DEVELOPERS:

Develop Software Systems Fast Using Our Development Tools.

- Full Featured, Applications Independent Forms Management System. Display Manager-Z80 Features:
 - Full Screen Forms Editor
 - Block Graphics Support
 - Automatic Data Validation
 - User Own Code Hooks
 - "Large Systems" Features
 - CRT Independence
- Development Library. Toolkit - Z80 Features:
 - String Functions
 - Specialized Communications Routines
 - CRT Independent Control Interface

For more information on these products and others, send for our free brochure:

SYSTEMS DESIGN NETWORK, INC.

P.O. Box 31232
Cleveland, Ohio 44131

NEW FOR YOUR Z-100

ZBERT is a video arcade game that will challenge the entire family.

Package includes "ARTIST", a graphics editor.

Requires ZBASIC & full Video Ram.

ONLY \$29.95

DUALPORT will intelligently parallel your Z-100* & Z-29* or Z-19* Terminal either direct or through a modem. Requires: ZDOS
ONLY \$39.95

* Z-100, Z-29, Z-19 ARE ZENITH Trademarks

Available at Heathkit Electronic Centers or when ordering direct add \$2 S/H. Kansas orders Add 4%. VISA & MASTERCARD ACCEPTED.

SUNFLOWER SOFTWARE, INC. (913) 631-1333
13915 Midland Drive • Shawnee, KS 66216

the way. Don't wait until after you've already raised an issue. More readers will be able to follow your article more easily with that material under their belt. And even if they decide the subject is too technical for them, they will still have learned something valuable.

If you're dealing with a lot of terms that the general *Sextant* reader might not be familiar with, you can always consider incorporating a glossary with the article, or a bit of background on the hardware. Material like this, set in its own box, not only explains things but it breaks up the page a bit.

How you apply these four rules is up to you. Sometimes, you need only flag a point at the beginning to show who should be interested in your new framis. Then you can go on and speak hardware for the rest of the article. Sometimes you will be talking almost exclusively in terms of applications, with the equipment taking a subordinate role. The main point is still to remember your audience: show them why your subject is of interest, let them get an idea of how they can use it in their world, and make it interesting and understandable to them in its own right, even if they're only observers.

If that's what I should do, what should I avoid?

One of the biggest things to avoid is assuming that the reader will have your level of knowledge. A game program is one case where you're likely to leave

material out of the explanation. Don't—even though "everybody knows that." Since it may be played by someone who is not skilled at computers, it should be readable and playable by *them*.

Call in someone who knows little or nothing about computers and have them try out the game relying only on the instructions that show up on the screen. Then you'll see how much you've taken for granted. This is basically the process the Heath Company uses to test out its kit-building instructions. *It works*.

The experienced user will breeze over the "extra" information. But inexperienced users can become hooked on computers when they find they can use the little monsters all by themselves.

For tutorials, a similar rule applies. Try to get your article read by someone who is of the level of knowledge you're aiming it at.

Considerations like these, by the way, are why many writers bury a work for a while, whether overnight or for a month or so. You can come back to it with new eyes. "Coming back to it with new eyes" is a talent worth acquiring, by the way. If you dragoon your spouse or siblings as non-experts, after a while they become experts and useless to your writing efforts. (Competition, even.)

Philosophy

If you've read the style guides from other magazines, you may have noticed that we're a bit different. Editorially, this

expresses itself in The One Absolute Rule: if in doubt, *submit*. You will not get a rejection because of grammatical boobos or something else that makes your writing not up to snuff. We figure it's our job to *edit*—that's what we're paid for.

As near as we can tell, it seems we're willing to spend a lot more time with an author and an article than some other magazines are. Some magazines are willing to print an article just as they get it. They leave it up to the readers to muddle their way through. Others expect perfection to be handed to them right out of your envelope.

Well, we figure we've found a good balance.

To a large extent, though, we don't have any choice. The community we represent and reach doesn't allow us to be either sloppy or smug. Most of you who write for *Sextant* are yourselves active users. You're probably not professional writers, but you can spot weaknesses in a technical article. That might be because you have a lot of knowledge and can see errors quickly. But it might also be because you're just starting out and can recognize when a writer has left you at sea. So as writers, you may need pointers because as readers you're demanding.

Getting writers and readers together—Heath/Zenith users communicating with other Heath/Zenith users—is *Sextant's* job. With your help, we hope to do it better in the future.

C and PASCAL

C86 by COMPUTER INNOVATIONS. The ultimate for UNIX compatibility, portability and additional features to exploit the power of your Heath/Zenith computer system. Free update for Optimizing=C86. Fastest execution time in BYTE Benchmark. Specify either Z005 or CP/M 86. \$395 (or write for discount)

BDS C by Leor Zolman. Fast and efficient. Quick, easy compile and link. Very popular in CP/M database community. Healthy subset of K&R de facto standard with some additional features. Ver 1.5. CP/M 80/85. \$150 (or write for discount)

C/80 and MATH PACK by THE SOFTWARE TOOLWORKS. Very popular in Heath/Zenith community. Fast and efficient. Reasonable subset of K&R de facto standard. Ver 3, floats and longs. Specify H005 or CP/M 80/85. Both packages for \$79.90 (or write for discount)

LUCIDATA PASCAL and P-CODE TRANSLATE by POLYBYTES. Sophisticated, powerful, p-code convenience as well as native-code speed and efficiency. Can be assembled and linked using Microsoft's M80/L80. Specify H005 or CP/M 80/85. Both Packages for \$80 (or write for discount)

All of the above compilers consistently rate high in published reviews and benchmark evaluations. They include superior documentation and have demonstrated outstanding user support. They are all very mature implementations and are royalty free.

The following EIGENWARE software packages are customized for Heath/Zenith computer systems:

GETTING STARTED in C . . . structured library of indexed examples and utilities for learning the C programming language. Includes macros and functions for H/Z features. Specify B05 or C/80 for CP/M 80/85; CP/M 86 or Z005 for C86. \$24.95

DISCOVERING PASCAL programming tutorial and source code library for the financial calculator. Specify IBM for Z005 or LUCIDATA for CP/M 80/85. \$24.95

FINANCE "what-if" on-screen analysis of time-valued financial transactions. Interactive selection of parameters. Solve for any one of the financial variables. Print amortization schedules. Specify CP/M 80/85 or Z005. \$24.95

ARCHIVE avoid disk clutter, save space by putting many ASCII (text) files in a single file. A very neat way to organize source code libraries and backup files of several different packages on a single disk. CP/M 80/85. \$19.95

EIGENWARE TECHNOLOGIES
13090 LA VISTA DRIVE
SARATOGA, CA 95070

Specify disk format: All 5" Zenith disk formats are supported except 96 tpi. Send check or money order. Include \$2.50 for shipping and handling. 6% sales tax for California residents.

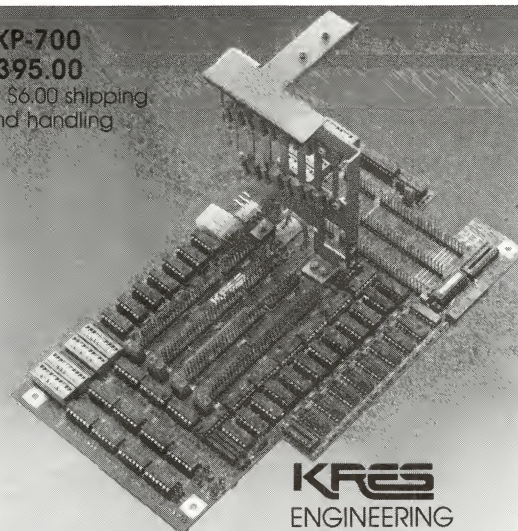
Expand your H/Z89-90

from KRES

Make your computer a more useful friend

- Now you can add all of those extra boards you've always wanted (color graphics, speech, robotic control, parallel—to name a few)
- The Kres Expansion enables you to put seven full sized boards inside your H89 cabinet; no external cables or boxes.
- Plug in any boards without any software modification
- Simple to install and use

EXP-700
\$395.00
+ \$6.00 shipping
and handling



KRES
ENGINEERING
P.O. Box 17328, Irvine, CA 92713
(714) 559-1047
(213) 957-6322
Bulletin Board: (714) 559-8579

Build a Sound/Clock Board for your '89

Now you can program music, sound effects, the time, and the date.

Ray Albrektson

My two children took one look at the latest "educational program" I had cooked up for them and sniffed with disdain. "It doesn't make any noises, Daddy!" I realized then that to compete with my son's Atari, my programs needed more than the standard "beep" provided by a stock H89. I would have to add (i.e., build) a sound board.

My first problem was to decide which sound chip to use. When I studied the data sheet on the General Instruments AY3-8910 Programmable Sound Generator, one of the most versatile such chips on the market, I was amazed. In one 40-pin package there are three oscillators (each digitally adjustable in frequency and volume), a noise gener-

ator (for explosion sounds), and an envelope generator that can modulate any of the other sounds with a variety of waveforms. Most intriguing of all, the AY3-8910 has two 8-bit ports that can be easily programmed for input/output (I/O) functions.

Since I was going to have to build a new board anyway, I also considered what else I might use it for. I recalled that I had read recently of a new clock-calendar chip from OKI Semiconductor, the MSM5832. This clever chip has an on-board oscillator and all the internal circuitry to provide data on time and date in a form easily adapted to acceptance by a microcomputer. A little bit of circuit juggling produced a clock/sound board design that interfaces both chips with the H89, and does it with only four additional chips and a few minor components.

The place you'd normally put such a board inside your computer is on one of the expansion connectors on the right side. But what if your right side is already full? With two disk controllers and a serial board, there is no room physically available for another accessory! Don't despair—with a little signal-stealing, you can mount the clock/sound board on the left side of the H89. However, build it and test it for the right side first, and when you know it is working, you can move it to the left side. (More on how to do this later.) The design discussed here should work for most users. You must, however, have available at least one of the three serial ports on your serial board.

Getting the big picture

The circuit I'm going to describe here is shown in Figure 1. The circuit has three major sections: address decoding (so the H89 can select the clock/sound board); sound generation and amplification; and the timekeeping section. Address decoding is taken care of by U1 and U2. The sounds are generated by the AY3-8910 chip (U3), and they are amplified by LM386 (U5). In addition, the AY3-8910 serves as a parallel interface to the MSM5832 clock/calendar chip. The timekeeping section includes: the clock/calendar chip (U4); capacitors C2 and C3; and crystal X1, which provides the time base. The hex inverter

(U6) assists in reading the clock. The clock chip itself is powered by a 9-volt transistor-radio battery to provide uninterrupted timekeeping.

H89 I/O made simple

The H89's central-processor unit (CPU) board is arranged so that accessory boards (disk controller, serial interface board, etc.) plug vertically into the three accessory positions on the right side. The signals available from these plugs are shown in Table 1, and the sound/clock board uses several of them.

When the computer wants to make use of one of these boards, such as to communicate to a serial port on the serial board, it needs to select just one board in such a way that the desired board is activated and the others (such as the disk controller board) are unaffected.

The way that the computer selects each board is through I/O decoding inside the CPU board. Pins 9-12 on each of the CPU's right-side 25-pin accessory plugs provide decoded I/O strobes (a strobe is a single pulse) for use by accessory boards.

Pin 9 is designated I/O 0, and is low whenever the CPU does an IN or OUT operation at addresses 320Q through 327Q. ("Q" designates octal notation.) Note that pins 2, 4, and 5 on the accessory connector plugs carry address bits A0-A2. This means that each accessory board must have the smarts to figure out a specific I/O address from the addresses on the A0-A2 lines and the I/O strobes on pins 9-12 of the accessory bus.

For example, if an accessory board has eight gadgets on it, and these have I/O addresses 320Q-327Q, then to pick gadget 4, the CPU will pull pin 9 low to indicate that the address is in the range of 320Q-327Q while the gadget address (03Q) is indicated by the A0-A2 address lines. As a result, the accessory board would have to "decode" this information and know to activate gadget 4 when this combination was encountered.

For this project, I chose to use I/O 0 (pin 9), which provides for decoding addresses 320Q-327Q. I selected this address because this is the one available for the "middle" chip on the HA-88-3 serial interface board. If you use all

P504		
Pin	1*	Ground
	2*	D0
	3*	D1
	4*	D2
	5*	D3
	6*	D4
	7*	D5
	8*	D6
	9*	D7
	10*	Ground
P510		
Pin	1*	+5 volts
	2*	Ground
	3*	A0
	4*	A1
	5*	A2
	6	Read
	7	Write
	8	Wait
	9*	I/O Serial 0 (active low)
	10	I/O Serial 1
	11	I/O Serial LP:
	12	I/O Cassette
	13*	2.048 MHz clock
	14	1.8432 MHz clock
	15*	Reset (active low)
	16	I/O 0 (bit D7 of port 362Q)
	17	I/O 1 (bit D8 of port 362Q)
	18	Interrupt level 3
	19	Interrupt level 2
	20	Interrupt level 1
	21	+12 volts
	22	-12 volts
	23	-5 volts
	24	+12 volts
	25	Ground

*Denotes pins used by clock/sound board

Table 1: Accessory bus signals for the H/Z89. The clock/sound board uses several of these.

three serial ports of your serial board, you're out of luck. At least one needs to be vacant (with the 40-pin serial chip actually removed) for the clock/sound board to work.

How the decoding hardware works

The decoding is actually accomplished by U1, which is a 74LS138 "one-of-eight decoder/demultiplexer." This is an "active-low" device, which is great, since the H89 uses "active-low" strobes. The A0-A2 inputs on U1 are connected to the A0-A2 lines of the H89 address bus at pins 3-5 of the accessory plug. When an I/O address between 320Q and 327Q is selected, pin 9 goes low and enables U1. The address on A0-A3 then determines which of the eight outputs of U1 will be brought low. If the I/O address is 320Q, then pin 15 goes low; if 321Q, then pin 14 goes low, etc. This provides unique address decoding for up to eight devices. Since only three are used, the other five are available for other projects requiring I/O decoding. For instance, you could add another AY3-8910 chip for stereo sound effects!

Construction of the I/O decoder section

You have some choices in how you build this board. It is fairly easy to build it with wire-wrap materials. You can even make a perfectly nice wire-wrap board with a fine drill and a piece of phenolic or Formica. Personally, I figure it is much easier to use a printed-circuit board. Even for a one-shot operation, it may not be difficult to find a company that has the photographic equipment and sensitized board to produce a printed-circuit board from the camera-ready artwork in Figure 3. If that's impractical for you, you can order the printed-circuit board from me. (The rest of the parts can be purchased easily, either by mail order or at your local electronics store. See Table 3.)

It is usually a good idea to build and test new circuits in stages. First the I/O decoding will be built and tested, then the programmable sound generator section will be added and tested, and finally the clock/calendar section. Don't cut this process short! Over a hundred people have built this board, and not one of

those who followed the step-by-step checkout method was unsuccessful.

First, check your tool inventory. Do you have a nice, light, and low-power soldering iron of the "Princess" type? Use fresh rosin-core solder, and remember that old solder does not flow as well as new (something about the rosin crystallizing). Have Solder Wick on hand to suck up surplus solder; and when it's all done, you will want some trichlorethane (flux remover) to remove the excess flux. At each checkout stage, you will need a volt-ohm-milliammeter (VOM). And buy, borrow, or beg a digital logic probe.

A word about static damage. The programmable sound generator (PSG for short) and clock/calendar chips are metal-oxide silicon (MOS) devices, and are susceptible to static damage. Keep them in their protective foam until just before installing them. When installing them, make sure that you are in a low-static environment, such as at a metal table on a wood or vinyl floor. (Not carpet!) Be sure you are not carrying a charge of static electricity before pick-

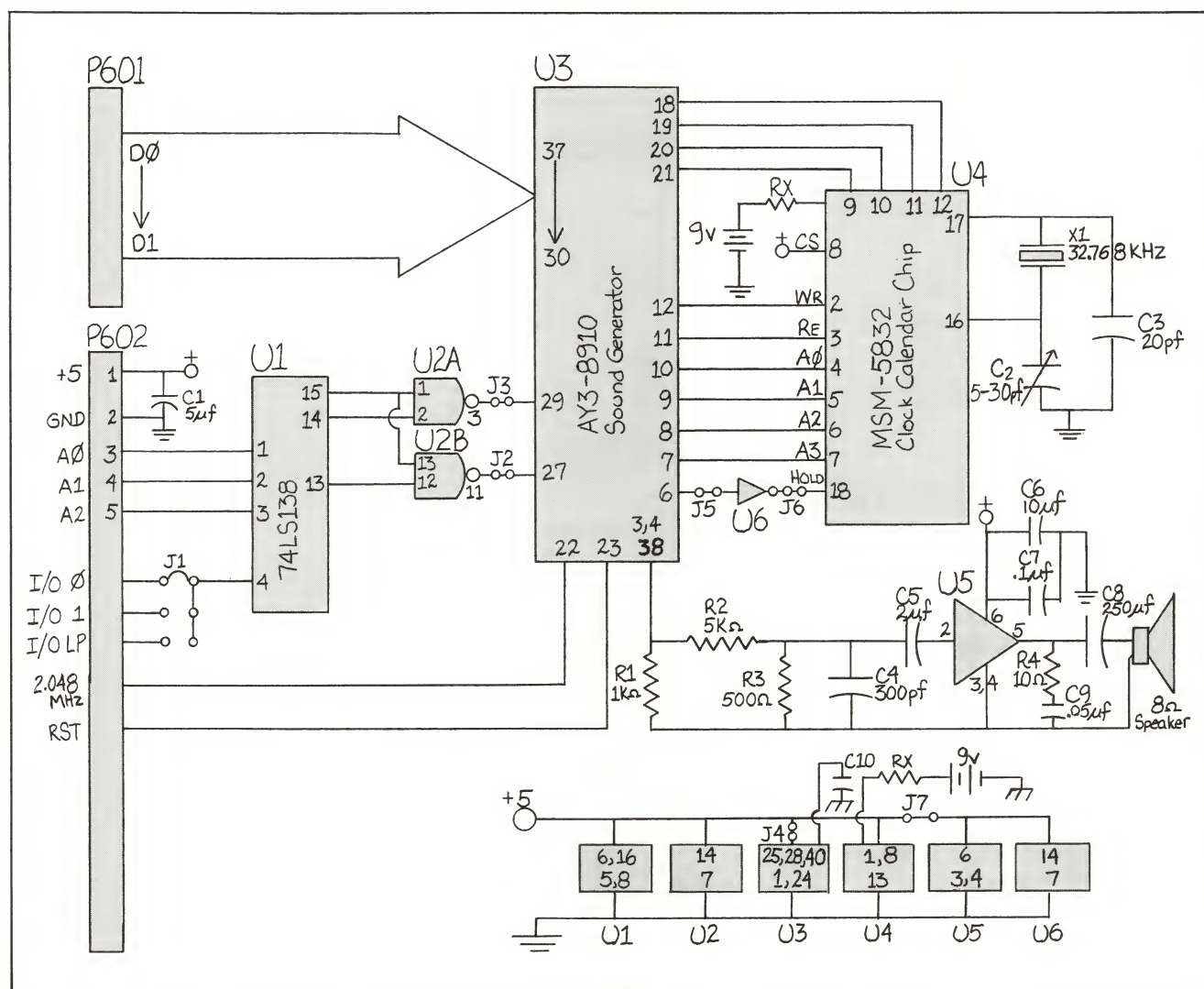


Figure 1: Circuit diagram of the clock/sound board. Address decoding is handled by U1 and U2. Sounds are generated by U3 and amplified by U5. The timekeeping section includes U4, U6, and crystal X1. The diagram at the bottom indicates the wiring of the six chips in relation to the +5 volt supply.

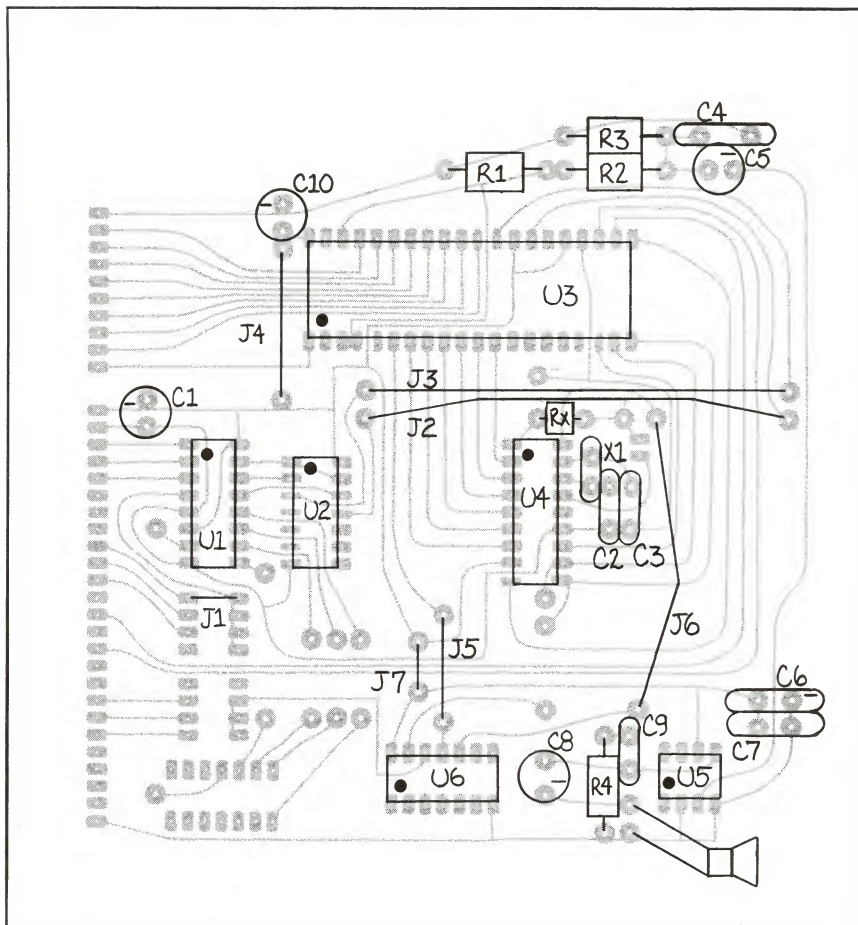


Figure 2: Layout of parts on the clock/sound board. Note dots in the corner of each chip (U1-U6) for correct orientation.

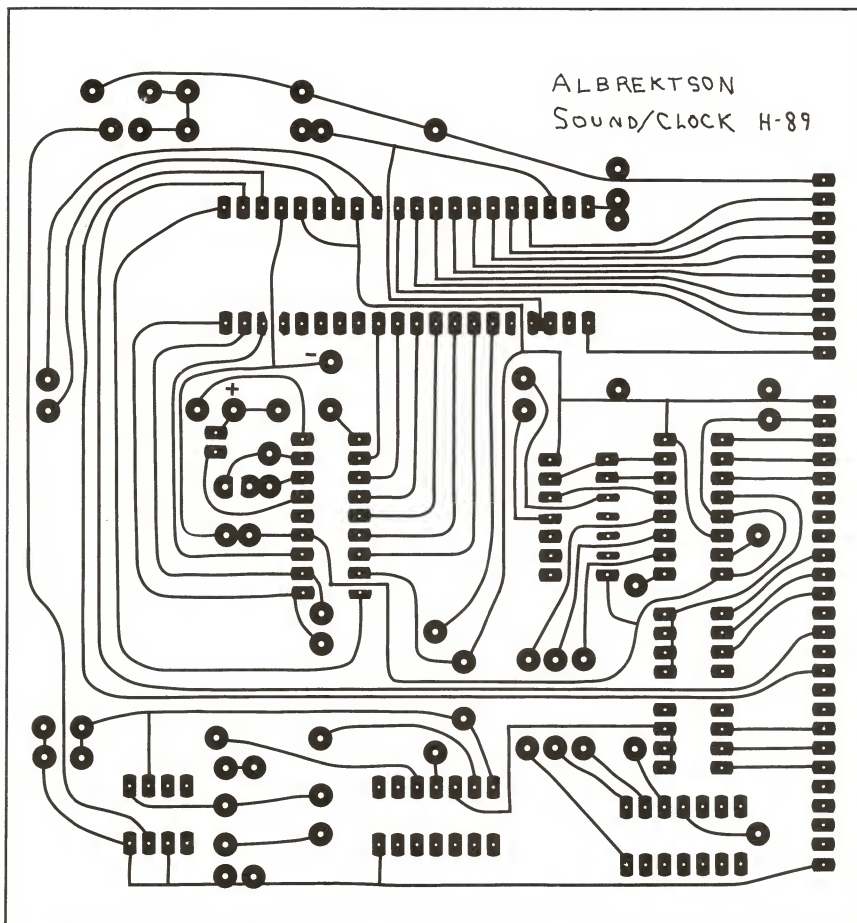


Figure 3: Camera-ready artwork for photographic production of the printed-circuit board.

ing them up—always touch the metal table first to eliminate any possible charge.

Begin construction by installing the 10-pin and 25-pin accessory connectors; the sockets for U1, U2, and U3; and jumpers J1, J2, J3, and J4. Using your ohmmeter, make sure that pins 1, 22, 23, and 24 on P-602 show infinite resistance compared with both pins 2 and 25. Also make sure that pins 2-9 on P-601 show infinite resistance to pins 1 and 10. These checks will ensure that the various power lines aren't shorted to ground, and can eliminate a lot of smoke from the "smoke test" when you finally turn it all on!

Carefully install U1 and U2. Make sure they are correctly oriented: pin 1 of U1 goes in pin 1 of the corresponding socket. (See Figure 2.) Be sure that no pins are bent under the IC, and that all pins go into their socket holes. Now the big moment is at hand. Slip the board onto a vacant accessory plug on the right side of the H89—and need I mention that power should be off?

Utter a quick prayer, and turn it on. The "H:" prompt should appear. Boot the system normally. Load MBASIC and run the program called STROBGEN.BAS (Listing 1).

Testing it with STROBGEN.BAS

This program will simply generate an I/O strobe at whatever address you want. With your logic probe touching pin 15 of U1, enter a "1" on the keyboard. This will send a strobe to I/O address 320Q and you should get a nice pulse on pin 15 of U1. Entering "2" should produce a pulse on pin 14, and "3" should do the same for pin 13. If you don't get these results, check the power and ground connections on U1 and be sure that the addressing is right. The jumper J1 should be connected to pin 9 of P-602—for addresses 320Q-327Q, that is! Be sure that nothing else in the computer is sharing those addresses!

If all is well, move to U2. Entering a "1" should produce a pulse on pins 3 and 11. Entering a "2" should only produce output on pin 3, and "3" should only produce a pulse on pin 11. If you don't get these results, check power and ground connections on U1, and be sure that U2 is indeed a 74LS00. (I spent a fruitless hour in the Twilight Zone before realizing that I had put the wrong chip in the socket for U2.)

Now that U1 and U2 check out, make a quick check of the empty PSG socket with the logic probe. Use the STROBGEN.BAS program and be sure that the pulses from U2 come through loud and clear on pins 27 and 29. At least the PSG will get the proper control signals if they do. Check that the 2.048 megahertz clock signal from the H89 is arriving at the PSG socket by looking for pulses on pin 2. Note that it is easy to accidentally touch pin 23 of the PSG socket—this

resets the PSG, and is connected to the H89 reset line. If you do touch pin 23, the H89 will probably reset, and you will need to reboot to continue checkout. Make sure you have pulsing on pins 30-37 (data bus), ground on pins 1 and 24, and +5 volts on pins 25, 28, and 40.

Sound generator construction and checkout

Turn off the computer, remove the board, and install U3 and U5 and all the resistors and capacitors associated with U5. To hook up an extension speaker to the sound section, I soldered a 1/8" mini-jack to two wires which in turn were soldered to the clock/sound board at the pads indicated in Figure 2. Note capacitor polarity—the negative end of C5 goes to pin 2 of U5 and the negative end of C8 goes to the speaker connection. Naturally, the negative end of C6 goes to ground. The rest of the capacitors aren't polarized. Note: do not yet install the glitch-catching capacitors C1 and C10. That is for the very, very end.

All hooked up? Put the board in place, hook up your speaker, and turn it on. Check voltages on U3 and U5. Are they all getting the required 5 volts? If so, boot and load FIRSTEST.BAS (Listing 2).

Congratulations! You should now be hearing marvelous sounds from the speaker. If not, check to make sure the proper strobes are going to pins 3 and 11 of U2. Make sure data pulses are actually present on all of pins 30-37 of U3. Make sure clock pulses are present on pin 22 of U3. If all of this checks out and there is still no sound, double-check all of the audio circuitry surrounding U5. Is the polarity of the capacitors correct? Is U5 correctly oriented? Is the speaker hooked up? Is it a good speaker? If you get desperate, borrow an oscilloscope, run the above program, and see if you get an audio waveform on pins 3, 4, and 38 of U3. If yes, then everything but the audio amplifier is O.K. Redouble your efforts on the audio amplifier. If necessary, try a new LM386. I have encountered bad ones before.

Clock construction and checkout

Remove the board once again and install sockets for U4 and U5. Next, install jumpers J5, J6, J7, and also capacitors C2 and C3. Carefully install the MSM5832 chip. (Mind the static!) Install U6, and double check the #1 pin positions on U4 and U6. Install the board, turn on the computer, and make sure the PSG is still alive. (Run FIRSTEST.BAS.) If things still sound good, run the program called TESTOSC.BAS (Listing 3).

This program puts the clock into the "interrupt generating mode" so that pulses at the rate of one per second will appear on pin 10 of U4 and one per minute at pin 11. If the pulses are there and at the proper intervals, *hooray*, the clock is running! If not, first take your logic probe and check the logic levels on

```

1 ' STROBGEN.BAS
5 'THIS PROGRAM WILL GENERATE I/O STROBES AT 320Q-322Q
10 R = 208 'THIS IS THE DECIMAL EQUIVALENT OF 320Q
20 I = R+1 'IF YOU USED OTHER ADDRESSES, ADJUST ACCORDINGLY
30 D = R+2
40 T = VAL(INPUT$(1)) :ON T GOTO 50, 60, 70
50 OUT R,0:GOTO 40
60 OUT I,0:GOTO 40
70 OUT D,0:GOTO 40

```

Listing 1: STROBGEN.BAS will generate an I/O strobe at whatever address you want.

```

1 'FIRSTEST.BAS--INITIAL PROGRAM TO TEST PSG SOUND PART OF BOARD
5 DIM N(15)
10 R = 208 'DECIMAL ADDRESS TO SELECT PROPER PSG REGISTER
20 D = R+2 'DECIMAL ADDRESS TO WRITE DATA TO PSG
25 'ADJUST LINES 10 AND 20 FOR OTHER THAN 320Q
30 FOR J = 0 TO 13 'READ DATA TO BE SENT TO PSG REGISTERS
40 DATA 155,0,77,0,58,0,0,248,16,16,16,107,39,10
50 READ N(J)
60 NEXT J
70 FOR J = 0 TO 13 'SEND 16 VALUES TO APPROPRIATE PSG REGISTERS
80 OUT R,J 'SELECT REGISTER J
90 OUT D,N(J) 'WRITE DATA N(J) TO REGISTER J
100 NEXT J 'DO AGAIN
110 STOP

```

Listing 2: FIRSTEST.BAS produces sounds for the initial checkout on construction of the programmable sound generator section of the clock/sound board.

```

10 'TESTOSC.BAS--TEST PROGRAM TO PUT INTERRUPT SIGNALS ON CLOCK CHIP D0-D3
20 OUT 208,7 'SELECT MIXER REGISTER
30 OUT 210,128 'SET MIXER FOR OUT ON B, IN ON A
40 OUT 208,15 'SELECT PORT B REGISTER
50 OUT 210,252 'OUTPUT 252, WHICH PUTS A0-A3, CS & R HIGH; & HOLD LOW
60 PRINT"FAST PULSES SHOULD BE ON D0, 1 SEC ON D1, 1 MIN ON D2, ETC."
70 PRINT"IF NO PULSES ON D0, THEN OSC. IS NOT RUNNING."

```

Listing 3: TESTOSC.BAS is used after constructing the clock section. It puts the clock in interrupt-generating mode to produce regular pulses on pin 10 of U4.

```

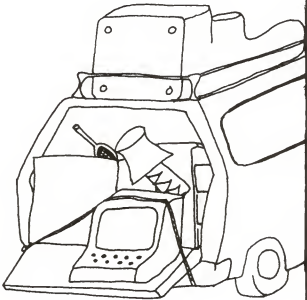
10 'READTIME.BAS READ TIME/DATE/YEAR FROM PSG
20 DIM T(14), M$(12)
30 DATA SUNDAY,MONDAY,TUESDAY,WEDNESDAY,THURSDAY,FRIDAY,SATURDAY
35 DATA JAN,FEB,MAR,APR,MAY,JUN,JUL,AUG,SEP,OCT,NOV,DEC
40 FORN=1TO7:READD$(N):NEXT N
41 FOR N=1TO12:READM$(N):NEXTN:N=0
50 R=208 'REGISTER SELECT PORT
60 D=210 'WRITE TO PSG PORT
70 I=209 'READ FROM PSG PORT
80 A=132+N*8 'CYCLE THROUGH EACH CLOCK COUNTER & COLLECT T(N)
90 OUT R,7
100 OUT D,128 'SET B FOR OUT, A FOR IN
110 OUT R,15
120 OUT D,A 'HOLD, WRITE = 0; CS = 1; A0-A3 AS DIRECTED
130 OUT R,14
140 T(N)=INP(I)-240
150 N = N + 1:IF N <> 13 THEN GOTO 80
160 S = T(0)+10*T(1)
170 M = T(2)+10*T(3)
181 IF T(5) = 0 THEN H=T(4):A$="AM":GOTO 200
182 IF T(5) = 2 THEN H=T(4)+10:A$="AM":GOTO 200
183 IF T(5) = 4 THEN H=T(4):A$="PM":GOTO 200
184 IF T(5) = 5 THEN H=T(5)+10:A$="PM"
200 W = T(6)+1 'TO BRING BACK TO SUNDAY=1 (INSTEAD OF 0)
210 D = T(7)+10*T(8)
220 MO = T(9)+10*T(10)
230 Y = T(11)+10*T(12)
231 Y$="19"+RIGHT$(STR$(Y),2)
240 PRINT H;" ":"M ":" ":"S:A$;" " ;D$(W) ;" " ;M$(MO) ;D;Y$
250 N = 0:GOTO 50

```

Listing 4: READTIME.BAS will allow you to watch the clock tick off seconds.

Index to Advertisers

Reader Service #	Page #	Reader Service #	Page #	Reader Service #	Page #
Abaris		Eigenware Technologies		The PC & J Graphics Co.	
101 CP/M emulator for Z-DOS.	72	125 C and Pascal compilers, tutorials, software.	77	146 H14 ribbons, programming aids.	88
ACCESS				Payload Computer Services	
100 Discount supplies, software, hardware.	2	FBE Research Co.		147 Hardware and software.	42
Ackerman Digital Systems		116 H/Z89 parallel printer interfaces.	57	Polybytes	
196 \$100 boards for Z100.	49	116 Spooler, RAM disk.	60	148 Lucidata Pascal, Z-DOS editor.	46
American Computer		Floppy Disk Services		Proteus Software	
188 Discount hardware and software.	49	117 Half-height drives.	99	168 3-dimensional graphics for the H/Z100.	20
Analytical Products		Friendliware		Quikdata Computer Services	
197 Utilities and enhancements for H19 and H89.	31	118 H89 games.	98	216 Hardware; software; newsletter.	39
Vincent Arias		The Golden Line		Reichert Digital Systems	
140 Stock management software.	60	127 Bulk mail processor for H89.	87	151 Personal accounting system.	57
Artra		H & H Computer Enterprises		Wayne Reses	
106 Waldo: Home control system.	93	123 Serial/parallel interface; printer drivers; printers; software.	63	229 HDOS communications software.	20
Bible Research Systems		126 Disk storage multiplier units for H/Z89/90.	72	Ross Custom Electronics	
143 The Bible on disk.	18	Hampton Business Machines		152 Programmer for EPROM, EEPROM, 8748, 8751.	58
Omar H. Brodie & Associates		Z100 word processing software.	85	S & K Technology	
113 Z-DOS engineering software.	92	Headware		230 Z-DOS text processor.	90
Buss		192 Public domain software directory.	63	Secured Computer Systems	
107 Heath/Zenith news 20x/year.	35	Hilgraeve		157 16K memory expansion card; serial and parallel I/O for H/Z89.	59
Buss Directory		203 Communications software.	62	Sextant	
176 Independent Heath/Zenith support.	54	Hudson & Associates		* Subscriptions.	19
C.D.R. Systems		138 Z100 8087 system support board.	101	103 Back issues.	69
109 H/Z89 disk controller.	58	Husker Systems of Nebraska		Sextant Publishing Co.	
110 H8 disk controller.	60	189 Programming courses; software subscription service.	100	191 Book on Heath/Zenith computers.	67
108 Winchester systems.	90	Interaction Dynamics Systems		* Function key utility.	49
CFX Disk Systems		135 Key remapping, general ledger, graphing, flight simulation software.	62	Skycastle Computer Products	
150 Discount hardware, software, supplies.	24	Jay Gold Software		218 Calligraphy programs.	87
CIMS, Inc.		120 Home finance system.	70	The Soft Firm	
240 CAD software for engineers.	43	KEA Systems		219 CP/M file transfer utility; H17 disk support system.	53
Cleveland Condonics		175 Z-DOS communications software.	31	SoftShop	
112 Graphics boards.	16	Kandueazy Computer Service		162 Utilities, languages, educational software.	13
Codewright		141 Power disturbance protection; structured programming aid.	74	The Software Subscription	
199 Z-DOS modem program.	28	Kres Engineering		163 Visual editor, text processor, cross reference program.	85
Computer Covers		195 Expansion for H/Z89.	77	Software Support	
115 Computer covers.	70	194 Dual speed module for H/Z89.	85	164 Disk drives.	21
D-G Electronic Developments Co.		Lindley Systems		The Software Toolworks	
114 H8 support, H89 enhancement, compatible computer.	96	132 Software including printer driver, accounting system, graphics.	47	165 CP/M spreadsheet.	55
Dennison Computer Supplies, Inc.		131 Gemini printers; Z-DOS utility package.	64	Software Wizardry	
130 Book about floppy disks.	back cover	MacroTech International Corp.		221 Light pen.	70
Dynacomp, Inc.		149 Z100 RAM upgrades.	50	166 Z100 systems.	27
121 H/Z100 software.	75	Magnolia Microsystems		Stuart Software	
		134 CP/M-Plus, 128K RAM board, I/O boards.	29	169 Decision support software, NFL game predictor.	72
		Mako Data Products		Studio Computers	
		154 H/Z89-90 all-in-one accessory bus expander.	85	Hardware and software.	4
		Mark of the Unicorn		Sunflower Software	
		155 Word processing software.	23	171 Z100 software.	76
		Microcomputers Software Technical Connection		Systems Design Network	
		159 CP/M mailing list program.	63	232 FORTRAN system development software.	76
		MicroFirm		161 H/Z89 communications, remote terminal software.	90
		207 H/Z19 VT100 upgrade.	47	Technical Micro Systems, Inc.	
		Micro Innovations		173 Z80/8086 upgrade for H/Z89.	32
		137 Word processing, filing, graphics software.	53	Trionyx Electronics	
		Microservices		* H8 support.	7
		209 H/Z100 color graphics.	59	21st Century Data	
		Micro World Publishing		233 CP/M rescue and repair software.	55
		183 Typesetting from disk or modem.	92	USS Enterprises	
		Newline Software		225 CP/M-Atari interface.	71
		145 Software.	40	* WordStar key customizer; CP/M-Z-DOS file transfer; C library.	57
		145 Check processing software.	53	Virtual Devices	
		145 CP/M BASIC graphics primer.	55	234 HERO 1 control system.	11
		145 Graphics software.	57	Westcomp	
		145 Tax preparation software.	59	235 Z-DOS recovery software; Piglatin translation software.	90
		New Orleans General Data Services			
		* H8 and H/Z89 accessories.	15		
		North Coast Intelligence			
		204 Floppy disk controller for H88-89.	47		



MOVING? Don't lose your next issue of *Sextant* in the shuffle.
Send your Change of Address to:
Sextant
Attn: Circulation Department
716 E Street, S.E.
Washington, DC 20003

*Contact advertiser directly.

MOVING? Don't lose your next issue of *Sextant* in the shuffle.
Send your Change of Address to:
Sextant
Attn: Circulation Department
716 E Street, S.E.
Washington, DC 20003

*Contact advertiser directly.

pins 6 through 12 of U3 (the PSG). They should look like this:

PIN 6 HIGH—this is inverted to a low by U5 & allows clock to run

7 H } Setting all these
8 H } high puts the clock
9 H } chip into the
10 H } "generate interrupt" mode
11 H } Enables the READ
function on the clock

12 LOW Disables the
WRITE function

13 don't care

If the logic checks out, but no pulses are forthcoming on pins 9-11, then maybe the oscillator inside U4 isn't running. Check the values of C2 and C3. C3 should be a 20 picofarad unit, and a mylar or silver-mica one will always work. Some ceramic ones I tried didn't. Check to make sure that the outputs of the PSG Port B match the inputs to the clock chip: pin 18 low; pins 3-7 high, pin 2 low, and pin 8 high. If they don't match up, look for bad socket connections or a bad solder joint. If these are correct, and the clock still isn't running, either U4, U5, or the crystal may be bad, and it is more likely to be the clock chip than the crystal.

But that doesn't apply to you—you have nice, solid one-second and one-minute pulses! (There are one-hour pulses as well, but they aren't worth waiting for.) Instead, load and run the program READTIME.BAS (Listing 4) to watch the clock tick off seconds. To set the clock, load and run the program CLOCKSET.BAS (Listing 5). If you can correctly set all digits, your sound/clock/calendar board is practically done.

Finishing up

By now you may be wondering where the clock is getting its power. After all, the battery hasn't been hooked up yet! The answer is that the clock chip is getting its juice from the H89 via the chip select input (pin 9). To power the clock while the H89 is off, a simple battery pack is more practical than an elaborate rechargeable system. After all, it will run for years on a single 9-volt transistor-radio battery! Hook up the 9-volt battery to the board. Using a volt-

Listing 5: CLOCKTEST.BAS allows you to set the clock.

```
10 'PROGRAM TO SET MSM5832 CLOCK ON SOUND/CLOCK BOARD
20 DIM T(14), C$(14)
30 DATA SECONDS,MINUTES,HOURS,DAY OF WEEK,@
   DAY OF MONTH,MONTH,YEAR,AM/PM,ZERO SECONDS,ALL-AT-ONCE,DO AGAIN
40 FOR N = 0 TO 10 :READ D$(N):NEXT N
50 R=208 'PORT ADDRESS TO SELECT CORRECT PSG REGISTER
60 I=R+1 'PORT ADDRESS TO READ FROM SELECTED PSG REGISTER
70 D=R+2 'PORT ADDRESS TO WRITE TO SELECTED PSG REGISTER
80 INPUT"HOW MANY DAYS ARE IN FEBRUARY THIS YEAR? ";L
100 '***READ TIME FROM CLOCK INTO T(0)-T(12)
110 PRINT :N=0
120 A=132+N*8 'CYCLE THROUGH EACH COUNTER
130 OUT R,7
140 OUT D,128 'PORT B FOR OUT, A FOR IN
150 OUT R,15
160 OUT D,A 'SET ADDRESS & OTHER LINES
170 OUT R,14
180 T(N)=INP(I)-240
190 N=N+1:IFN=13THENGOTO210ELSEGOTO 120
200 '***DISPLAY TIME
210 PRINT "TIME: ";IFT(5)=5ORT(5)=1THEN PRINTT(4)+10;:GOTO 230
220 PRINT T(4);
230 PRINT10*T(3)+T(2);10*T(1)+T(0);
240 IF T(5) = 5 OR T(5) = 4 THEN PRINT "PM";:GOTO260
250 PRINT "AM";
260 PRINT " DAY OF WEEK:";T(6)+1;"DATE: ";
270 IF T(8) = 5 THEN PRINT 10+T(7); 'LEAP YEAR
280 IF T(8) = 4 THEN PRINT T(7); 'LEAP YEAR
290 IF T(8) < 4 THEN PRINT 10*T(8) + T(7);
300 PRINT10*T(10)+T(9);10*T(12)+T(11);
310 IF T(8) > 3 THEN PRINT "LEAP YEAR" ELSE PRINT
320 PRINT
400 '***DISPLAY TIME-SET OPTIONS & BRANCH TO SELECTED OPTION
410 FOR N = 1 TO 10:PRINT N,D$(N):NEXT N
430 INPUT"ENTER THE NUMBER OF THE UNIT TO CHANGE (OR <CR>): ";CH
440 ON CH GOSUB 460,500,540,570,640,680,720,760,2000,3000
445 CH = 0:PRINT:GOTO 110
450 PRINT:GOTO 110
460 '**CHANGE MINUTES
470 INPUT"NEW MINUTES: ";V
480 A=24:T=INT(V/10):GOSUB800
490 A=16:T=V-INT(V/10)*10:GOSUB 800:RETURN
500 '**CHANGE HOURS
510 INPUT"NEW HOURS: ";V
520 A=40:T=INT(V/10):GOSUB 800
530 A=32:T=V-INT(V/10)*10:GOSUB 800:RETURN
540 '**CHANGE DAY OF WEEK
550 INPUT"NEW DAY OF WEEK: (1-7)";V
560 A=48:T=V-1:GOSUB 800:RETURN
570 '**CHANGE DATE
580 INPUT"NEW DAY OF MONTH: ";V
590 A=64:T=INT(V/10):GOSUB 800
600 A=56:T=V-INT(V/10)*10:GOSUB 800
620 IF L = 29 THEN A=64: T=4+INT(V/10):GOSUB 800:RETURN
630 RETURN
640 '**CHANGE MONTH
650 INPUT"NEW MONTH: ";V
660 A=80:T=INT(V/10):GOSUB800
670 A=72:T=V-INT(V/10)*10:GOSUB800:RETURN
680 '**CHANGE YEAR
690 INPUT"NEW YEAR: ";V
700 A=96:T=INT(V/10):GOSUB800
710 A=88:T=V-INT(V/10)*10:GOSUB 800:RETURN
```

Please refer to the key to the right when completing the article evaluation form on the attached Reader Service Card above. By letting us know how interesting and/or helpful you found each feature in this issue of *Sextant*, you will help us choose the best articles for you in the future.

1. Frederick Zimmerman, *A Z100 on Every Desk*: Clarkson College, p. 8.
2. Lee C. Syer, *Drawing on Your Heath/Zenith Computer*: Ed-A-Sketch, p. 17.
3. Charles W. Rogers, *Optimizing Benton Harbor BASIC's Numerical Output*, p. 25.
4. Leonard E. Geisler, *Create Forms on Your MX-80*, p. 33.
5. Frederick Zimmerman, *CHUGCON 83: Sharing Expertise*, p. 41.
6. Graham Wideman, *Why Won't All That IBM-PC Software Run on My Z100?*, p. 51.
7. Siebert Ickler, *Screen Dump!*, p. 61.
8. Charles E. Cohn, *More on HDOS STAND-ALONE*, p. 71.
9. John Walker, *Guide to Writing for Sextant*, p. 73.
10. Ray Albrektson, *Build a Sound/Clock Board for Your '89*, p. 78.
11. Skip and Pam Chambers, *How One Family Learned to Live with an H89: A Dialogue*, p. 91.
12. Dean Gibson, *Disk and File Management*, p. 97.


```

720 ***CHANGE AM/PM
730 A = 40
740 IF T(5)>3 THEN T=T(5)-4:GOSUB800:RETURN
750 IF T(5)<3 THEN T=T(5)+4:GOSUB800:RETURN
760 ***ZERO SECONDS
770 T=0
780 A=8:GOSUB800
790 A=0:GOSUB 800:RETURN
800 '***SUBROUTINE TO WRITE TO CLOCK
810 ' A = ADDRESS VALUES, T = DATA VALUES
820 OUT R,7
830 OUT D,192 'SET B FOR OUT, A FOR OUT
840 OUT R,15
850 OUT D,0:FOR J=1 TO 10:NEXT J 'DELAY AFTER PUTTING IN HOLD
860 OUT R,14
870 OUT D,T 'PUT DATA ON D0-D3 OF PORT A
880 OUT R,15
890 OUT D,A 'PUT ADDRESS BITS ON PORT B
900 FOR J = 1 TO 10:NEXT J 'DELAY BEFORE WRITING
910 OUT R,15
920 OUT D,A+2 'ADD WRITE COMMAND TO PORT B
930 OUT R,15
940 OUT D,128 'TAKE OFF HOLD
950 RETURN
2000 '***SUBROUTINE TO ENTER MONTH, YEAR, DATE, DAY, HOURS,@
MINUTES, SECONDS, AMPM
2010 INPUT"ENTER MONTH: ";M01
2020 INPUT"ENTER DAY : ";D01
2030 INPUT"ENTER YEAR : ";Y01
2040 INPUT"ENTER DAY/WK: ";W01
2050 INPUT"ENTER HOURS: ";H01
2060 V = M01:GOSUB 660
2070 V = D01:GOSUB 590
2080 V = Y01:GOSUB 700
2090 V = W01:GOSUB 560
2100 V = H01:GOSUB 520
2110 RETURN
3000 '***SUBROUTINE TO RE-DO M,Y,D,DAY,H DONE PREVIOUSLY
3010 GOTO 2060

```

meter, select a value for Rx that will result in about 4.5 volts at pin 1 of the clock chip. This has to be determined individually, since the MSM5832 varies considerably from unit to unit in its power consumption. All that remains is to install the glitch-catching capacitors C1 and C10 (mind the polarity!!) and wash off flux residue with trichlorethane.

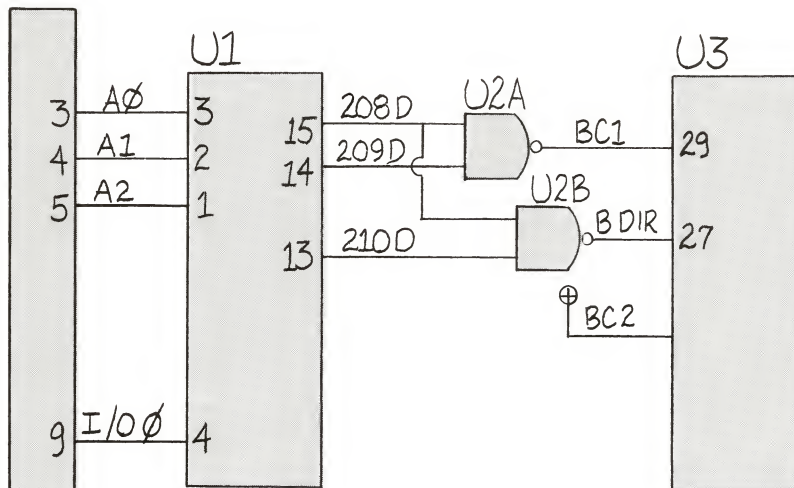
What about left-side installation?

Once the board is up and running in a right-side slot, it can easily be adapted to run in a left-side slot. This involves isolating the clock board from all the signals that are present on the 25-pin connectors on the left side (except for power and ground), and "stealing" the signals it needs from a right-side board.

First, remove the 25-pin connector from the clock board and carefully cut off pins 3, 4, 5, 9, 10, 11, 13, and 15. This leaves only the power and ground connections intact. Re-install the 25-pin connector.

Next, decide which right-side board you want to use as a signal-stealer. I chose the serial board. (I have a horror of goofing up my disk controller!) Using a piece of six-conductor ribbon cable, connect pads 2, 4, 5, 9, 13, and 15 on the clock board to the corresponding pads on the serial board. If you used some other address than 320Q (the "middle" chip), then connect pads 10 or 11 instead of 9.

P602



I/O Address:	BDIR	BC1	BC2	PSG Function
208D	1	1	1	Latch Address
209D	0	1	1	Read from PSG
210D	1	0	1	Write to PSG
All others	0	1	0	PSG inactive

Programming the AY3-8910 PSG

In dealing with the PSG, I really prefer to program it directly. However, there is plenty of ready-to-run software available that takes practically all the effort out of generating music and sound effects. One excellent item is the Sound Device Driver, available for \$10 from SigmaSoft and Systems of Dallas, Texas. Generating music and sound-effects is as easy as sending character strings to the sound device driver. Also, I offer a disk of sound and clock utilities for \$10. This runs under the Heath Disk Operating System (HDOS) and includes a directory of other software sources supporting this sound generator and clock.

The AY3-8910 has great power, and programming it is not difficult to learn once you understand what the PSG is looking for. The PSG makes sounds depending on what values are stored in its 16 internal registers. In order for the H89 to read and write to these registers, the PSG responds to three commands: 1) latch register address from CPU into PSG (H89 tells PSG which register is to be read from or written to); 2) read from PSG (PSG transfers the value in the register indicated in the preceding step onto the data bus); and 3) write to PSG (the H89 transfers the value on the data bus into the PSG register indicated in Step 1).

See Figure 4 to discover how these commands are generated. Note how the

Figure 4: Generation of programmable-sound-generator signals. See text under "Programming the AY3-8910 PSG" for details.

DEALERS DEALERS DEALERS

SSI WORD*PERFECT —customized to the Z-100 running Z-DOS

Word processing with the clean screen look.

Function key technology provides most features at the press of a key.

- * **ON SCREEN FORMATTING** provides a "what you see is what you get" document.
- * **MATH, MERGE** packages, and **FOOTNOTE** ability included.
- * **MACRO** function provides key stroke memory.
- * **HELP** key provides on-line assistance with a key-stroke.
- * **PRINT BUFFER** supports two printers and will hold up to nine documents at one time.
- * Supports most popular single or dual bin sheet feeders.
- * **SUPERSCRIPT, SUBSCRIPT** and **HALF-LINE SPACING**.

Dual Document editing now supported.

HBM
Division of DP Service Inc.
5559 N. Elston Ave.
Chicago, IL 60630
(312) 774-2556

SSI Sorter and Speller now available.

Circle #181 on Reader Service Card

Double the Speed of your H/Z89-90 Cut computing time by as much as 50%

Fast Operation

With the Dual Speed Module, software that used to be slow and inefficient now zips right along. Run programs like SuperCalc (in "auto mode") and Spellstar without long waits.

Easy

Simply replace your existing microprocessor IC with the Dual Speed Module and stop wasting time. Installation requires no trace cutting or soldering.

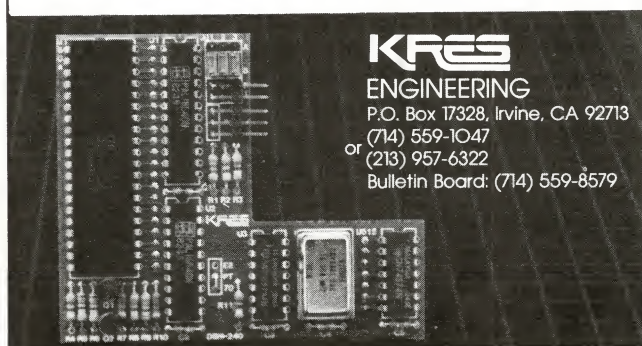
Fully Supported

Software support for CP/M and HDOS. Works with Magnolia Microsystems*, CDR, and many other disk systems.

Dual Speed Module DSM-240 \$79.95 + \$3.50 shipping and handling (includes CP/M or HDOS; add \$10.00 for both).**
*Requires Software Patch PMM-100 \$49.95 and Monitor ROM KMR-100 \$59.95

**Prices valid through December 31, 1983

CP/M is a registered trademark of Digital Research



KRES

ENGINEERING

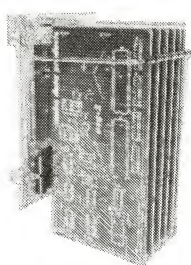
P.O. Box 17328, Irvine, CA 92713

(714) 559-1047

or (213) 957-6322

Bulletin Board: (714) 559-8579

Circle #194 on Reader Service Card



H89/Z90's CAN NOW DEAL WITH A FULL DECK!

THE ORIGINAL ALL-IN-ONE
ACCESSORY BUS EXPANDER.

MH89+3 doubles expansion capacity. Allows for 6 right-hand type cards instead of the usual 3. Room at last to run those neat accessory boards you've seen advertised!

Piggyback motherboard installs internally with a screwdriver in just minutes - with no modifications! 3 slots exactly duplicate the originals. The 3 added slots occupy unused addresses and eliminate previous conflicts. 100% compatible with all accessory boards!

No overheating problems! Simple design draws little power. Leaves plenty of overhead for the minimal load of most accessories. Full technical information provided.

The best news about this "No-hassle" design is the price — **ONLY \$150**. About 1/3 the price of other solutions!

Price includes assembled and tested MH89+3 expander, complete instructions and one (1) year warranty. CA residents add 6% tax. USA include \$5 shipping. Foreign add \$10. Telephone and COD orders accepted.

mako data products

1441-BN, RED GUM, ANAHEIM, CA 92806
PHONE (714) 632-8583

Circle #154 on Reader Service Card

THE SOFTWARE SUBSCRIPTION

VISED 3.0 is now available for ZDOS, CP/M-85, HDOS and CP/M-80. Now you can use the same editor in all four operating systems. VISED 3.0 is a visual editor with fast scrolling, searching and text manipulation. VISED 3.0 is versatile enough to be used as a text editor as well as a program editor. VISED/Z is sold as a two disk package for ZDOS and CP/M-85.

VISED is also distributed as **VIPROC** with TPROC, a text processor. TPROC is a text processor for applications requiring quality formatted text, such as letters, documentation, reports, and papers. It reads a file of text and commands and generates output to disk or printer. TPROC does filling, adjusting, centering, underlining and formatting with titles.

XREFBAS programs generate a variable name and line number cross reference list which can be output to the screen disk or printer. XREFBAS programs read from an ASCII file and display the line number being analyzed and all variable name or line numbers discovered on that line. The variable name and line number cross references may be generated together or the variable name cross reference may be generated separately. And best of all, they are FAST!

VIPROC/Z—VISED & TPROC (ZDOS & CP/M-85) ...	\$75.00
VISED/Z—Visual Editor (ZDOS & CP/M-85)	\$50.00
VIPROC/H—VISED & TPROC (HDOS)	\$50.00
VISED/H—Visual Editor (HDOS)	\$35.00
VIPROC/C—VISED & TPROC (CP/M-80)	\$50.00
VISED/C—Visual Editor (CP/M-80)	\$35.00
XREFBAS—Basic Cross Referencer (ZDOS/CP/M-85/80/HDOS)	\$30.00
FTCOM—Remote Computer Communications (HDOS/CP/M)	\$30.00

Visal/MasterCard 1 to 9 pm Pacific time 415-237-2115
Order Postpaid at PO Box 5379, Richmond, CA 94805
Calif. res. add 6% sales tax (BART counties 6.5%)

Circle #163 on Reader Service Card

Register Decimal Octal		Function	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	Channel A Tone period	8-bit fine tune A							
1	1						4-bit coarse tune A			
2	2	Channel B Tone period	8-bit fine tune B							
3	3						4-bit coarse tune B			
4	4	Channel C Tone period	8-bit fine tune C							
5	5						4-bit coarse tune C			
6	6	Noise period				5-bit period control				
7	7	$\overline{\text{Enable}}$	$\overline{\text{In/Out}}$		$\overline{\text{Noise}}$			$\overline{\text{Tone}}$		
			IOB	IOA	C	B	A	C	B	A
8	10	A amplitude				Mode	4-bit amplitude			
9	11	B amplitude				Mode	4-bit amplitude			
10	12	C amplitude				Mode	4-bit amplitude			
11	13	Envelope Period	8-bit fine tune envelope period							
12	14		8-bit coarse tune envelope period							
13	15	Env. shape/cycle					Cont.	Att.	Alt.	Hold
14	16	I/O port A	8-bit parallel I/O port A							
15	17	I/O port B	8-bit parallel I/O port B							

Figure 5: The 16 internal registers of the programmable sound generator and the functions they control.

three I/O addresses, 320Q-322Q, are decoded into control signals for the PSG. Note that U1 has access to bits A0-A2 of the H89 address bus. It responds to the I/O strobe on pin 9 and decodes it based on the address on A0-A2. This produces strobes on pins 7 and 9-15 that correspond with the I/O address. U2 combines these into two control signals that control the three things that the PSG can do: read from PSG, write to PSG, and latch address into the PSG. When an I/O command addressed at 320Q is issued, pin 15 goes low. This causes the outputs of U2A and U2B to go high, which the PSG interprets as "Latch address into PSG."

Without going into too much detail, the number of the PSG memory register to be written to or read from is now on the data bus; and when the PSG gets this command, it latches it into its internal memory so that at the next READ or WRITE instruction, the PSG knows which of its 16 registers is being referenced. An I/O command addressed to 321Q causes pin 14 of U1 to go low, causing only pin 3 of U2 to go high. This is interpreted by the PSG as "Read from PSG." This causes the data in one of the 16 PSG registers to be transferred onto the data bus and to

be read by the H89. The last option, an I/O command at 322Q, therefore brings pin 13 of U1 low and pin 11 of U2 high, and means "Write to PSG." The data on the data bus is then written into the PSG register indicated by a previous "Latch register address" I/O instruction.

The 16 internal registers of the PSG control its many functions (Figure 5). Register pairs 0-1, 2-3, and 4-5 are all tone control registers; the frequency of each of three separate oscillators can be individually set by writing the correct values into these registers. (For detailed information on which values to use to produce a particular frequency, consult the AY3-8910 Data Manual, available from parts suppliers.)

Register 6 is the "noise period" register; the noise generator can be made to sound high and sharp, or low and boomy. Different explosion noises can be produced by selecting different noise periods.

Register 7 is the most important to understand thoroughly. It is the "mixer register" and turns on any of the tone and noise effects. It is also used to set the directionality of the two I/O ports on the PSG, called Port A and Port B. In the section on communicating with the

clock chip, we will see how these ports work.

Registers 8, 9, and 10 are the volume control registers for the three tone channels. Volume levels from 0 to 15 can be written into these registers to control volume. If the volume is set at 16, the actual volume will track the envelope determined by the envelope generator, which is controlled by registers 11, 12, and 13.

Registers 11 and 12 together set the period of the envelope. The envelope period can range from a short fraction of a second to almost nine seconds. The envelope shape has eight options, each selected by writing the appropriate bits in register 13. (See Figure 6.)

How the clock chip is hooked in

Remember that one of the freebies with the AY3-8910 sound chip is the availability of two 8-bit parallel ports! One of the ports (Port "A") will be used to transfer data to and from the clock chip; and the other port (Port "B") will be used to control the clock chip. Port A uses four lines to interface with the clock chip's four data lines (D0-D3). Seven lines of Port B are used to control the clock's READ, WRITE, and HOLD inputs

R13 Bits				Graphic representation of envelope generator output.
B3	B2	B1	B0	
0	0	X	X	
0	1	X	X	
1	0	0	0	
1	0	0	1	
1	0	1	0	
1	0	1	1	
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	

B3: Continue
 B2: Attack
 B1: Alternate
 B0: Hold

Figure 6: The envelope shape has eight options, each selected by writing the appropriate bits in register 13.

and to provide address information A0-A3 to select the clock chip's internal counters.

Take a look at Figure 7. Notice that the clock chip has 13 internal registers, and that they may be either read from or written to. The selection of the correct register depends on the value of the address inputs A0-A3. (Note that these address lines have nothing to do with the H89's address lines!)

For example, in order to read the M10 counter, the four-bit address the counter needs would be 1100B (binary). Our first step would be to program Port B for output, and then put 1100B onto B3-B6 (bits 3 through 6 of Port B). To program Port B for output, we use register 7 of the PSG. The value to be written into that register to produce output on Port B and input on Port A would be 10XXXXXXB, where the X's indicate "Don't care." From an MBASIC program, we could use OUT 208.7 to select register 7 of the PSG, followed by OUT 210.128 (where 128D=10000000B), thus setting the PSG for output on B and input on A.

Reading the clock chip

The next step is to figure out what to put on the Port B lines that control the clock chip that would result in reading the M10 register. Bit 0 could be anything, since it remains unconnected. Bit 1 should be 0 since we want to read, not write; and bit 2 should be 1 for the same reason! Bits 3 through 6 control the

EPSON GRAPHICS

★★ For H89 and H100 ★★

CALLIGRAPHY PACKAGE

Add a new dimension to your printed text. Your EPSON printer with GRAFTRAX can do more for you. SKYCASTLE's program package can combine dot graphics images from disk files and standard text to create custom letter heads, labels, title pages and advertisements. The set of programs includes a screen mode character editor, a program to build and print lines of graphics characters and a starter set of alphabets, pictures and borders.

H100 version requires CP/M-85. H-89 version requires CP/M and 48 or 64K of memory. When ordering, please specify memory size. Price of package, including 60 page manual with tutorial, is \$49.95. (Calif. residents add sales tax.) (Also available at some Heathkit Electronic Centers)

FX CHARACTER DOWNLOADER

Owners of FX series printers can load new letter sets into the printer's internal RAM. Use our editor to create your letter sets and transfer them to the FX. Character editor and downloader \$29.95. (Owners of the Calligraphy package can add the downloader for \$14.95.)

(This ad, including border, printed with the CALLIGRAPHY package and reduced 30% for publication)

SKYCASTLE COMPUTER PRODUCTS
 P. O. Box 1412 San Carlos, CA 94070

CP/M is a trademark of Digital Research. GRAFTRAX is a trademark of EPSON America

Circle #218 on Reader Service Card

Businesspersons

Now you can save money on bulk and presort mailings with your H-89

- Fast. • Automatic.
- Build complete mailings from address files.
- Automatic piece assignment to mixed state, state, 3 digit zipcode, & 5 digit zipcode bundles.

MAILGOLD TM

bulk mail processor

For CP/M with 48K min.
Price: \$112.50

The Golden Line TM
 P.O. Box 7188
 Silver Spring, MD 20907

Please send me MAILGOLD on:

☐ hard ☐ soft sectored 5 1/4" floppy.

Name _____

Address _____

Price: \$112.50

Include payment, in U.S. funds.

MD residents add 5% sales tax.

Circle #127 on Reader Service Card

clock chip's register addressing, so they would be B3=0, B4=0, B5=1, B6=1. With these values, the A0-A3 lines on the clock chip would see 0011B, which corresponds to the M10 register.

Finally, B7, which governs the clock's HOLD line, could be either low or high. When low, it sets the HOLD line of the clock high, and enables accurate reading and writing. In practice, it is not necessary to HOLD the clock for reading, but it is required when writing. In this particular example, we will not HOLD the clock, so B7 should be high.

Putting this all together, we find that the eight bits to appear on Port B should be 1001110XB. The decimal equivalent of 10011100B is 156D. If we put 156D on Port B, the clock chip will be more than happy to put the M10 data on its D0-D3 lines. To put 156D on Port B, we do an OUT 208,15 to select Port B, then an OUT 210,156 to actually write the data.

Hang in there—we're almost done. All we have to do is program the PSG to read Port A, and transfer the information to the H89.

First, indicate that Port B is to be addressed by doing an OUT 208,14 followed by M10=INP(209) and at last we have our desired information. If it is 2:28 a.m., then we should have M10=2, right? Surprise! Upon inspection it is 240D too high! What is going on? Note that not all eight lines of Port A on the PSG are used. The high four bits are left floating, and

internal pull-up resistors make the high-order bits all ones! In reading from Port A the PSG always sees "1111XXXXB." So you must always subtract that 11110000B (240D) from the values read from the PSG.

Writing to the clock chip

Writing to the clock chip only has to be done once—to set the time! It is a bit tougher than reading since timing is more critical. Here is the drill; first set both ports for output. The Register 7 value for this is 11XXXXXXB. Issue the commands OUT 208,7 and OUT 210,192 (192D=11000000B). Next put a HOLD on the clock. To do this, just make B7 low: OUT 208,15 followed by OUT 210,0. That will bring everything on Port B low; and as the low on B7 is inverted by U6A, it will cause activity in the clock registers to crash to a halt.

Next, the data to be written has to be put on Port A. If you want to write a 4 into the M10 register, then start by putting "4" on Port A: OUT 208,14 and OUT 210,4 should do the trick. The address of the proper clock counter needs to be put on Port B next. Since the data on Port B is already 00000000B, all we have to do is calculate the address value for the desired clock counter and put it out Port B—the clock will continue to HOLD since B7 will still be 0. Since the M10 register address is 1100, we want to put 00011000B on Port B. This is 24D, so do an OUT 208,15 and OUT 210,24. We now have register M10 selected, a HOLD in effect, and the data to be written all in place on Port A.

All that remains is to switch the WRITE bit (B1) high for a fraction of a second. To turn on the B1 bit, just add 2 to the value already on Port B. The commands

ATT: H-14 USERS!

Super, high quality ribbons are available for your H-14. Nylon in composition.

And they don't just come in black!!

"Jet Black" "Purple"

"Royal Blue"

Really different. \$4.95 ea. or 3 for \$12.00. Please add \$1.25 for postage & handling. (N.Y. residents, add sales tax.)

H-19/H-89/H-8 USERS

We also carry a complete line of programming aids for your computer.

- * Flowcharting Sheets
- * Video Layout Sheets
- * Printer Layout Sheets
- * Graphic Plotter Sheets
- * Printer Plotter Overlay
- * COBOL Programming Sheets
- * Paper Porter

\$4.50 ea. (Plus \$1.25 postage)

ATT: ATARI/APPLE USERS

We now carry a specialized line of unique & unusual software & hardware for the ATARI and APPLE computers.

Send for our **FREE** catalog. . .

The PC&J Graphics Co. Inc.

PO Box 108/Deer Park, NY 11729
516/667-8076

Register address	Register contents	Port B Value	
		To read registers: (includes READ bit) (HOLD bit is off)	To write registers: (Doesn't include WRITE bit) (HOLD bit is on)
0	S1	132	2
1	S10	140	10
2	M1	148	18
3	M10	156	26
4	H1	164	34
5	H10	172	42
6	W	180	50
7	D1	188	58
8	D10	196	66
9	MO1	204	74
10	MO10	212	82
11	Y1	220	90
12	Y10	228	98

Table 2: This table indicates which values are to be put on Port B in order to read from or write to a desired clock register. For example, if you want to write to the Y1 register, just put 220 (decimal) on Port B.

A0	A1	A2	A3	Internal Counter	D0	D1	D2	D3	Data Limits
0	0	0	0	S1 note (1)	*	*	*	*	0-9
1	0	0	0	S10	*	*	*	*	0-5
0	1	0	0	M1	*	*	*	*	0-9
1	1	0	0	M10	*	*	*	*	0-5
0	0	1	0	H1	*	*	*	*	0-9
1	0	1	0	H10	*	*	(2)	(3)	0-1 or 2
0	1	1	0	W	*	*	*	*	0-6
1	1	1	0	D1	*	*	*	*	0-9
0	0	0	1	D10	*	*	(4)	*	0-3
1	0	0	1	MO1	*	*	*	*	0-9
0	1	0	1	MO10	*	*	*	*	0-1
1	1	0	1	Y1	*	*	*	*	0-9
0	0	1	1	Y10	*	*	*	*	0-9

Notes:

*Indicates that data is valid as 0 or 1. Blanks appear as 0 during a READ and are unrecognized during a WRITE.

1. Writing anything to the S1 or S10 zeros both regardless of D0-D3.
2. D2 is 1 for p.m. and 0 for a.m. when in 12-hour mode.
3. Writing 1 to D3 sets it to 24-hr mode. Writing 0 to D3 puts it in 12-hour mode.
4. Set D2 for 1 if leap year, otherwise set D2 at 0.


```

1 'WRITDEMO.BAS--WRITES DATA IN LINE 20 INTO CLOCK
5 DIM D(13)
10 FOR N = 0 TO 12 :READ D(N): NEXT N
20 DATA 1,1,2,2,3,0,4,2,2,1,1,9,9 'NOV22-99,WED,3:22:11AM
60 OUT 208,7 'SELECT MIXER REGISTER
70 OUT 210,192 'SET PORTS A AND B FOR OUTPUT
80 FOR N = 0 TO 12
100 'WRITE D(N) TO THE CLOCK
110 OUT 208,15 'SELECT PORT B
120 OUT 210,0 'PUT ON HOLD BY MAKING B7 = 0
130 FOR N=1TO5:NEXT N 'WAIT A BIT FOR COUNTERS TO SETTLE
140 OUT 208,14 'SELECT PORT A
150 OUT 210,D(N) 'PUT DATA VALUE D(N) ONTO PORT A
160 OUT 208,15 'SELECT PORT B
170 A = 2 + 8*N 'COMPUTE COUNTER ADDRESS FROM VALUE OF N
180 OUT 210,A 'PUT ADDRESS VALUE ONTO B PORT KEEPING HOLD ON
190 FOR N=1TO5:NEXT N 'WAIT A BIT FOR ADDRESS TO SETTLE
200 OUT 208,15 'SELECT PORT B
210 OUT 210,A+2 'TURN ON WRITE--TRANSFER DATA INTO CLOCK
220 OUT 208,15 'SELECT PORT B
230 OUT 210,128 'TURN OFF HOLD BY MAKING B7 = 1
240 NEXT N

```

Listing 6: WRITDEMO.BAS is a program to write to the clock registers.

```

5 'READDEMO.BAS--READS CLOCK COUNTERS INTO D(0)-D(12)
10 DIM D(13)
40 OUT 208,7 'SELECT MIXER REGISTER
50 OUT 210,128 'SET PORT B FOR OUT, PORT A FOR IN
60 FOR N = 0 TO 12 'READ ALL 13 CLOCK COUNTERS
70 A = 132 + N*8 'CALCULATE ADDRESS VALUES
80 'NOTE THAT A 4 FOR THE READ BIT IS INCLUDED
90 OUT 208,15 'SELECT PORT B
100 OUT 210,A 'PUT ADDRESS & READ ON THE B REGISTER
110 OUT 208,14 'SELECT PORT A
120 D(N)=INP(209) 'READ DATA FROM PORT A
130 D(N)=D(N)-240 'CORRECT FOR D4-D7 BEING HIGH
140 NEXT N

```

Listing 7: READDEMO.BAS is a program to read from the clock registers.

OUT 208,15 and OUT 210,26 would do the job. The data on Port A gets transferred to counter M10 in the clock, and as soon as the HOLD is removed, activities will commence on schedule. Note that as long as the HOLD is on for less than a second, the internal registers will keep their correct time. We take the HOLD off by writing something like 1XXXXXX to Port B: OUT 208,15 and OUT 210,128 (1000000B=128D).

The reason for the inverter in the HOLD line is related to the presence of internal pull-up resistors in the PSG. The PSG is RESET when the computer is turned on, and both the PSG ports go to 11111111B at RESET. If the HOLD input of the clock was directly connected to one of these ports, it would go into immediate HOLD, and the time would suffer as a result. These same resistors in the PSG serve the clock chip, which would otherwise require external pull-ups.

If all of this register-juggling seems hardly worth the effort, and you're thinking you'll spring a few hundred bucks for that Hayes Chronograph after all, wait! All you *really* have to do is use the handy-dandy table (Table 2) that tells you exactly what to put on Port B in order to read or write a desired clock register. For example, if you want to write to the Y1 register, just put 228D on Port B. To write the D1 register, put 58 on Port B. A couple of sample MBASIC

programs that do just this are WRITDEMO.BAS and READDEMO.BAS, contained in Listings 6 and 7.

A few last words . . .

Once you have the parts on hand, assembling and testing the clock/sound board is just a Saturday afternoon project, and the results are worth it! You have the time and date available at all times, callable from BASIC or assembly-language programs. The sound effects that are possible are just amazing! The blend of sirens, flying saucer noises, buzzes, and explosions were just what my kids were yearning for, and my once-scorned "educational" games are now the season's biggest hit!

Ordering Information

Printed-circuit board, \$30, postpaid
Sound and clock utilities, \$10, postpaid
—HDOS 5" hard-sectored disk format only
Ray Albrekton
A.C.P.O. Box 51
Quezon City 30001
Philippine Republic

Sound Device Driver, \$10
Sigmasoft and Systems
4488 Spring Valley, #107
Dallas, TX 75234
214/392-1025

Integrated-circuit chips:

U1	74LS138	8-line decoder
U2	74LS00	Quad 2-IN NAND gate
U3	AY3-8910	PSG (Note 1)
U4	MSM-5832	Clock chip (Note 2)
U5	LM386	Sound amplifier
U6	74LS04	Hex inverter

Connectors:

Sockets:

for U1	16-pin
for U2, U6	14-pin
for U3	40-pin
for U4	18-pin
for U5	8-pin

Right-angle headers: (Note 3)

P601 10-pin	Molex part # 22-15-2101 Heath part # 432-1074
P602 25-pin	Molex part # 22-15-2251 Heath part # 432-1076

Resistors, capacitors, diodes, misc.:

X1	32.768 crystal (Note 2)	
B1	9 volt	battery clip
C1, C10	5 microfarad	capacitors
C2	5-30 picofarad trimmer	capacitor
C3	20 picofarad	capacitor (mica)
C4	300 picofarad	capacitor
C5	2 microfarad	capacitor
C6	10 microfarad	capacitor
C7	0.1 microfarad	capacitor
C8	250 microfarad	capacitor
C9	0.05 microfarad	capacitor
R1	1,000 ohm	resistor
R2	5,000 ohm	resistor
R3	500 ohm	resistor
R4	10 ohm	resistor
Rx	varies with U4	resistor

Note 1: available from:
Digital Research Computers
P.O. Box 40156
Garland, TX 75040

214/271-3538
MasterCard and Visa accepted

Note 2: available from:
Concord Computer Products
1971 South State College
Anaheim, CA 92806
714/937-0637
MasterCard and Visa accepted

Note 3: available from:
Force Electronics
343 Hindry Avenue
Inglewood, CA 90306

Note 4: an 8-ohm speaker is also necessary.

Etched & Drilled Printed Circuit Board
available from author for \$30 postpaid. Send
check or money-order to:

Ray Albrekton
A.C.P.O. Box 51
Quezon City 3001
Republic of the Philippines

Software available from the author, on 5" hard-sectored HDOS disk only, includes SOUNDED.BAS (sound-effects editor), CKDVD (clock-setting utility), prologue for setting system date on boot-up, and information on including time information in directory files, etc. Price is \$10 postpaid.

Table 3: Parts list. Except as noted, most parts should be available from local suppliers. (Also see ordering information at the end of the article.)

ELECTRONIC MESSAGE CENTER AND REMOTE SYSTEM ACCESS

- Your H/Z-89 Personal Computer can become a complete Electronic Message Center. Use it remotely or locally to:
 - SEND TELEXES
 - MAIL LETTERS
 - LEAVE MESSAGES FOR ASSOCIATES
- Access remote computers as a terminal to transfer files and have local printing capabilities.
- Access your computer from remote terminals without fear of unauthorized access.

ALL OF THIS IS CONTAINED IN A SINGLE PACKAGE, CRT-Z80, FOR MORE INFORMATION SEND FOR OUR FREE BROCHURE.

SYSTEMS DESIGN NETWORK, INC.
P.O. Box 31232
Cleveland, Ohio 44131

Circle #161 on Reader Service Card

EFFECTIVE JANUARY 1, 1984 WESTCOMP PRICES INCLUDE THE SHIPPING & HANDLING CHARGES! ALL ITEMS ARE PREPAID* - YOU PAY ONLY FOR THE PRODUCT AND NOTHING ELSE.

*EXCEPT COD ORDERS. CALIFORNIA RES. INCLUDE PROPER SALES TAX.

✓ FETCH

A very fast .COM program that will recover ZBASIC (version 1) source programs. If the control-reset keys are depressed or a return to Z-DOS is made, just use FETCH to recover the last source code that was loaded!! Another nice feature is loading a ZBASIC program that was saved in the protected format and using FETCH to recover an UNPROTECTED (!) copy of it!!! REQUIRES: Z-DOS \$29.95

✓ PIGLAT

This program will take an ASCII text file and translate it into PIGLATIN! This is just what you need for those special notes and letters when you want to add a personal touch! This was written in the C language and we include the complete source code! Interesting as well as entertaining. REQUIRES: Z-DOS \$29.95



If you would just like the source listing without the disk or the executable program: \$21.95

CATALOG or COD ORDERS

@ 714-629-3029

WESTCOMP

23441 Golden Springs
Suite 300
Diamond Bar, Ca. 91766

Circle #235 on Reader Service Card

WATCHWORD

The word processor and full screen editor for the Z100 and ZDOS.

FRIENDLY - FAST - FLEXIBLE

- See subscripts, superscripts, underlining and boldface directly on the screen
- Create your own fonts and special characters
- Remap any key and configure to your printer
- Written in native 8088 assembly language for fast response

Other features: centering, formatting, microjustification, arbitrary line length, automatic horizontal scrolling, split screen, macros, and color.

For additional details, send a SASE.

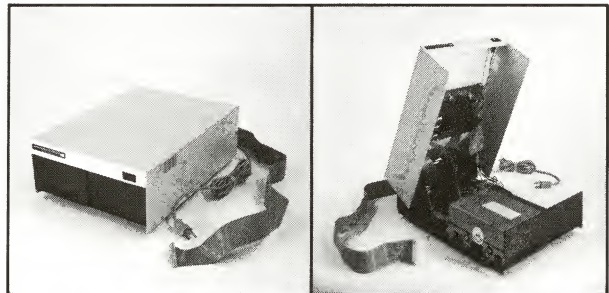
Demo Disk: \$3.00
WatchWord with
Manual: \$100.00

S & K Technology, Inc.
4610 Spotted Oak Woods
San Antonio, TX 78249
512-492-3384

ATTN: Steve Robbins

Circle #230 on Reader Service Card

NOW 12 MEGABYTE (CDR-10M) \$2995



WINCHESTER SYSTEM For the Heath/Zenith Computer

Systems complete with software, case, power supply, signal cable and interface.

Runs with CP/M, on the H/Z89 & H8 (with Z80 card).

- Switching power supply
- Expansion for backup installations
- Auto attach BIOS
- Hard disk utilities
- Formatting program
- 1 year parts & workmanship warranty

CP/M is a trademark of Digital Research. Heath, H8, H89 are trademarks of Heath Corporation. Zenith, Z89, Z90 are trademarks of Zenith Data Systems.

5-20 day delivery.
Pay by check,
C.O.D., Visa,
or M/C.



Contact:
C.D.R. Systems Inc.
7210 Clairemont Mesa Blvd.
San Diego, CA 92111
Tel. (619) 560-1272

Circle #108 on Reader Service Card

How One Family Learned to Live with an H89: A Dialogue

Pioneering on the frontiers of technological change is not without its costs.

Skip and Pam Chambers

Skip: I am writing this history of my affair with a Heathkit H89 computer as a warning to other users and prospective purchasers. While organizing my thoughts, my wife felt that some of her comments would also be appropriate. Therefore, what follows is our recollection of how a happy family learned to live with an H89.

Pam: *First of all, I'm not even using a word processor to write this. I avoid any direct contact with our home computer for fear of having to use it.*

Skip: It all began in the spring of 1980. The personal computer was still a fairly new idea. People were just becoming aware of them. Computer stores were opening, magazines were discovering them, but nobody seemed to know much about them. I saw an ad for a National Technical Schools correspondence course on computers. Part of the course was building your own Heathkit computer. It was an H89 with 16K RAM (16 kilobytes of random-access memory—it sounds bigger when you say it that way, doesn't it?).

Having built a Heathkit digital multi-meter, this looked like the way for me to enter the world of computers. After all, how much harder could a computer kit be?

By Thanksgiving, I had received the first part of the computer: the bottom. Assembling the base was no big deal. After all, I still had my digital multi-meter to check my work. The base was all I had, though. It was March before the next kits came. Since my family was skeptical about the whole project, I was quick to point out how useful the base had already been as a doorstop and paperweight. They didn't seem impressed.

Eventually, the basic machine was completed. One entire Sunday was spent soldering little plugs on little wires for the cassette interface. Everyone had gathered around for the powering on ceremony. As far as I was concerned, it was great! My three-year-old's only comment was "Why doesn't it talk?" In retrospect, perhaps it would have been better to stop right there. (Does anyone need a slightly used cassette interface?)

Build a computer

The disk controller board and drive

were installed later in the week. It was at this point that my education really began.

Lesson 1: When the book says to remove a circuit board before changing parts, do it.

Lesson 2: Don't drink more than two or three cans of beer before plugging integrated-circuit (IC) chips into a computer.

Lesson 3: ICs are really tough little gadgets. Installed wrong, they can really get hot.

The next day, after parts and tempers had cooled, we had a working H89 computer. Our family had entered the

I'm scared that someone will swallow an integrated circuit with the mashed potatoes.

computer age. Our budget and records could now be properly organized. The kids would be computer literate. With all the time we would save, life would be wonderful. (Imagine a happy family gathered around the computer, all smiling with music in the background, just like in the TV ads.)

On page 2 of the manual for the Heath Disk Operating System (HDOS), it says that 32K of memory is required to run HDOS. Call Heath and wait for parts. Page 3 says "Insert a blank diskette...." Call Heath and wait for parts. United Parcel Service is really quite efficient. The first boot only took slightly over a week.

The system ran just fine; budget data was entered—after buying the PIE editor. Things worked as advertised—after buying Microsoft BASIC and lots of diskettes—but not as expected.

Skip left a set of instructions with me so that the children can use the computer when he is away. The instructions begin with "plug in" and end with his office phone number. I live in fear that one of the kids will say, "Change the disk, Mommy."

The kids did not really want to be computer literate, I wasn't saving any

time, and none of us really knew what to do with the thing anyhow. After all, how often can you do your budget each month?

A couple of years ago, when Skip was trying to convince me of the value of having a home computer, he interested me by saying that all my recipes could be organized, filed, and stored ready at my fingertips. I have thousands of recipes stuffed in drawers, languishing as bookmarks, and being used as scratch paper. Dreams of an organized kitchen and a printout as a shopping list filled my head. Well, that was two years ago and my recipe disk contains a single recipe for strawberry meringue pie, which I never make because I don't know how to put the disk in.

Rebuild SYSCMD.SYS

It was then that I discovered HUG—the Heath Users' Group. While browsing at my local Heathkit store, I found a collection of REMark issues. These became the source of many projects.

One article contained a program providing enhancements to the HDOS command, STAT, by which you find out the status of your various devices. The program worked just fine, but I felt it really ought to be included in HDOS's command processor, SYSCMD.

So I purchased the Heath course on assembly language and went to work on the problem. In just three months of non-stop work, I had picked SYSCMD apart, learned how it worked, and put it back together with the new STATUS code included. Of course, a few problems arose along the way. I deleted my source-code file by mistake, crashed disks, and became frustrated with some of HDOS's limitations.

This led to more enhancements. SYSCMD got an UNDELETE command, clock support, abbreviated commands, and more flexibility. While this was very nice, it took all summer. (My four-year-old asked if the computer could talk yet. It couldn't.)

Since I bought the computer to save time, I had to make it run faster. So I looked around for areas where improvement was obviously called for. Well, obvious to me, anyway. One that I saw was PIP, the peripheral interchange program. It worked well enough at its job,

Heath/Zenith Users ! Programmers ! Authors !

Coded text files can be typeset directly from your diskettes, including all **H8** and **H/Z89-90** disk formats and now — all **H/Z100**. Or send your files via Modem (300/1200) or Compu-Serve™.

Typesetting control codes are easy to use. Most typesetting requirements can be handled with just seven commands:

FT — Font Style	LS — Line Spacing
SZ — Type Size	LL — Line Length
= — Center Line	> — Flush Right
[— End paragraph (left justify)	

Embed these simple codes in your text and, suddenly, typesetting can be very affordable. And, since you create the diskette files that control the typesetter, you're assured of error-free, "no-typo" typesetting.

We can also provide professional keyboarding and editing. Check us for all your needs—

- software .DOC
- business cards
- special forms
- instructions
- letter-heads
- menus
- brochures
- newsletters

Send \$5.00 for a copy of our **Typesetting Codes Reference Manual**. Write or call (evenings best) for free introductory information. With typesetting you can inexpensively go—

Micro
World
Publishing

1102 Winona Street
Northfield, MN 55057
(507) 645-5496
(507) 645-4611

Visa or MasterCard Accepted

Circle #183 on Reader Service Card

Large
Small
Bold
itty
Condensed...and lots more!

CIVIL AND STRUCTURAL ENGINEERS

Software prepared by Professional Engineers for Professional Engineers. For use under DOS (MS-DOS) or CP/M85 for Z-100 series computers. Written in MBASIC, or compiled FORTRAN77 (with source code). Reasonably priced from \$75 to \$500, for complete software packages, including documentation, sample problems, and printouts. Documentation and listings only are also available.

BRIDGE GIRDER, for prestressed, precast concrete, any section, truck and/or wheel loads. Conforms to AASHTO Code. Computes moments, stresses, deflections, elastic shortening, and shears.

PRESTRESSED BEAM, same as Bridge Girder, except for uniform loads such as roof and floor loads. Conforms to ACI Code.

RETAINING WALL, for three surcharge conditions. Computes trial design, with stability and soil pressures. Allows for designer modification. Printout contains area of steel at various cutoff points.

SURVEYING PACKAGE, computes traverses with closure error, coordinates, inverses, line to line and curve to line intersections. Horizontal and spiral curves. Oblique triangles.

HYDRAULIC PACKAGE, solves for trapezoidal and rectangular channels using Manning's formula. Analyzes historical stream flow records and prepares statistical recurrence data.

STRUCTURAL PACKAGE, computes moments, shears, and deflections for variously loaded members. Designs footings and foundation walls. Computes rigidity of structure from horizontal forces.



OMER H. BRODIE & Associates

2705 N. Springview Drive
Coeur d'Alene, Idaho 83814 (208) 664-5675

Circle #113 on Reader Service Card

handling things like copying and getting directory lists. But every time something like that would be done, SYSCMD would have to process my command and then load PIP to do the job.

So one obvious area of improvement was to eliminate PIP and add its function to SYSCMD. This would save loads of time not doing all that work to load PIP every time I wanted a directory list.

There was only one problem: it wouldn't work.

By Halloween, though, the end was in sight. I missed the trick-or-treating to work on it. Thanksgiving was a blur. For some reason, my H89 was moved from the house to the garage the day before Christmas. New Year's Day came, and the program worked! PIP was gone. Pam seemed less than thrilled with this news. In fact, she wasn't talking to me much at all.

Finally, I had the time to enter the budget data for the last three months. I was only a little further behind than before we had a computer to help.

My five-year-old asked if I would now make the computer talk. I decided that was a good idea, as soon as I installed the accelerator, the HUG modification to make the computer run twice as fast.

It was here that I forgot Lesson 2, and by now the beer consumption was away up. Did you know that the window on an EPROM chip can glow like a little lamp? It is really an impressive sight. The accelerator had to work because I needed the speed for my next project: rewriting HDOS. It did, too, in only four tries.

Then there are those fascinating little projects and modifications that consume him for months on end. He walks in the door from work and turns on the computer before he says hello. He jumps out of bed in the morning and lets the computer "warm up" while he shaves. Seems like a great method of birth control, rather expensive though. I sometimes hold the children up in front of the screen and say "This is Mandy. She is five now."

Those "little modifications" look like major construction projects to me. We are a regular stop for the local UPS truck. When Skip is trying to "make a few changes" to something, I know I'm going to lose my kitchen counter space to integrated circuits and soldering irons. I'm scared that someone will swallow an integrated circuit with the mashed potatoes.

By this time, I understood HDOS well enough to know that it used too much memory and too much disk space. Following my now proven, if inefficient, methods, I managed in just three months to rewrite HDOS and its overlays.

Since I had put the work into what was now really a new product, I decided to offer it for sale. I sent a letter with a product announcement to Buss newsletter and they carried it. I had become

an independent supplier to the Heath/Zenith community.

My version of HDOS, which is organized completely differently from Heath's, uses only one-half the disk and memory space, and has more features. Finally my budget and MBASIC will fit into the computer.

Reflect upon one's successes

There is my organized, efficient husband who puts all our household budget and records on the computer. We used to have a four-drawer file cabinet with lots of folders clearly labelled: Life Insurance; Taxes; etc. Now everything in our life is on one tiny disk. If he kicks the bucket before I learn what to do when the display says BOOT, I'll never be able to collect the insurance.

After almost three years, we have a running H89 with HDOS and an automated budget. This has been a worthwhile and fascinating experience. For example, from an analysis of my budget I have learned that I really can't afford a personal computer. My children may not be computer literate, but they have learned many new words.

I really resent our computer's record-keeping ability. All of our receipts are immediately entered so at the end of each month he can see how much I went over budget. In the "good old days," we had a shoe box full of receipts and I could slip a purchase or two right by him. Sometimes he didn't even bother to add up all of those little numbers, but not now. With just a couple of furious swipes at the keyboard, I can get yelled at in record time.

Oh yes, I finally bought a Type-N-Talk speech synthesizer from Heath. When I showed it to my six-year-old, she didn't seem too interested. Kids just don't have any patience today.

Our computer has a voice and I am the only one in the family who can't understand it. I ask my six-year-old to translate.

I have just taken inventory of my programs. While no single application, alone, can justify the cost of the computer, taken together they might.

For example, it is a super word processor. At the present time that is no big deal, since I only process a few words a year. It won't be long until the kids are using it for term papers, though. I wrote a nifty subroutine to do my income tax return as part of my budget program. (It reduced my taxes so much that my return is being audited.)

One of our other high tech purchases is a video tape machine. Kids like cartoons, and cartoons are short so you can get a lot of them on a hundred or so tapes. Kids also like to watch a specific cartoon when they want it. The computer is the only practical way to index and locate titles in an ever changing cartoon population.

The list goes on.

And reflect a little bit more?

If you detect a tone of fear on my part, you may be right. It may be hard for the majority of you to believe, but there are mechanical morons out here. We're the type whose palms get sweaty just looking for the on-off control on a tuner (which used to be called a radio). When the car's temperature light glows red, we're the ones who turn on the air-conditioning to cool things down. We even have trouble using a plumber's helper effectively. With this mental make-up, the computer revolution is just about as comforting to us as the French Revolution was to Marie Antoinette.

Actually, it is an awesome revolution. One that has a potential of changing nearly every aspect of our lives. And, yes, that can be frightening!

Having a hacker for a husband has forced me to think about things. If we're concerned about the quality of the relationship between husbands, wives, children, and friends, will the addition of the computer in so much of our lives be a benefit? Or will we be more isolated from each other because of it? Or, if I put aside my suspicions and jump right in, will it free me from a lot of the drudgery of a 9 to 5 existence?

It is exciting to see six- and seven-year-old children practicing math skills using the computer. They get a kind of one-on-one experience the teacher can't give them. But, then again, this one-on-one experience is with a machine. I've seen a

child's face light up as bright as the red and green SUPER spelled out on a screen after he has completed a series of problems. Then I've seen him look around for someone to see his triumph.

Can you see where we are heading? There's no harm in being patient with those of us who have our doubts. We'll join you in this revolution in spite of them.

Just being a computer "hacker" is not all bad either. I believe my HDOS/SYSCMD is one of the most convenient products around. Some people work crossword puzzles or play chess for recreation. I like to find new ways to do things on my computer. It can be an interesting, if frustrating, mental challenge.

There is just one thing in the back of my mind that bothers me as I spend my time with the H89. Do you remember all those jokes and science-fiction stories about building The Ultimate Computer? There's a one liner that I recall every so often.

This company built the ultimate computer. The first question they asked it was, "Is there a god?"

It replied, "There is now!"

Ordering Information

One Module HDOS and New SYSCMD:
\$30 each or both for \$50
Skip Chambers
3822 Westminster Drive
Carrollton, TX 75007

Authors:

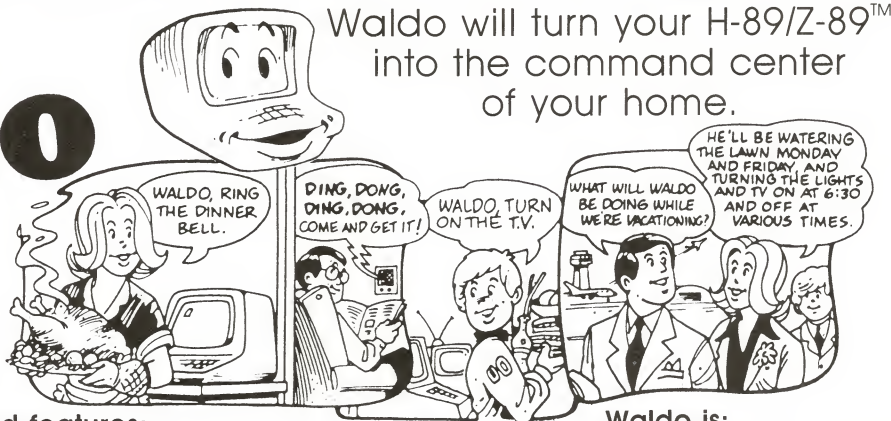
Have you considered writing an article for *Sextant*? We're looking for human-interest stories, in-depth technical features, program descriptions, product reviews, and tutorials which relate specifically to Heath/Zenith systems. We pay more than many other micro-computing magazines. Send your article, idea, rough draft, or outline to: John Walker, Technical Editor, *Sextant*, 716 E Street S.E., Washington, DC 20003.



Meet...

Waldo

The Voice-Activated Home Control System



Waldo will turn your H-89/Z-89™ into the command center of your home.

Waldo has as standard features:

- voice recognition (Note: Waldo's speaking voice is optional)
- real-time clock/calendar
- BSR X-10 home control interface
- stereo music and vast and varied sound effect capabilities
- a disc with a full library of application programs including the HOUSEMASTER voice/time control program depicted above
- a complete operating manual

Waldo is:

- a multi-function circuit board with a complete software package
- easily plugged into any H-89/Z-89™ computer
- available in kit or assembled/tested versions
- a voice link between you and your computer
- a control link between your computer and your home
- the heart of a system that will be expanded with a variety of plug-in components and new software

H-89/Z-89 are registered trademarks of Heath/Zenith.

Please send me:

- ☐ Waldo—main board with standard features. Circle CP/M or HDOS.
- ☐ Battery Backup for continuous clock/calendar operation.
- ☐ VOICEMOD-1-robot-type synthesized speech with unlimited vocabulary.
- ☐ VOICEMOD-2-human quality speech with a 206-word vocabulary.
- ☐ Additional information.

Method of Payment: ☐ Check or money order ☐ Visa/Mastercard ☐ COD (add \$5.00)

Prepaid orders shipped free. VA residents add 4% sales tax.

Mail to: ARTRA, INC., P.O. Box 653, Arlington, VA 22216 (703) 527-0455.

	Kit	Assembled
	\$399.00	\$499.00
	\$ 29.00	\$ 39.00
	—	\$249.00
	\$199.00	\$229.00

Call 703/527-0455

Ask

"Does Waldo live here?"
and get a
30% discount!

Classified Ads

Software

FORTTRAN support for HDOS: 9511/12, MICRO-CORE graphics, overlay, sort, metric conversion, console input, bit manipulation, HDOS interface sub-routine libraries. Microtran, 76 Flintwell Way, San Jose, CA 95138.

Function key driven Z-DOS GRAPHICS DUMP to Prowriter and Tally printers. Dumps any of three video planes. Some reverse video. Requires Z-BASIC. \$31.95 (prepaid) incl. diskette. Custom Software, 10316 N.E. 118th Place, Kirkland, WA 98033.

H/Z89 SOFTWARE: Let "The Collector" sort your hobbies into user-defined fields. Configure for Records, Coins, or ?. Totals Cost as well as Current Values. Searches and prints specific information (Artist, Label, Condition). Be organized! Requires H/Z89, 64K, CP/M, MBASIC, & 2 drives. Includes 5 1/4 HS disk and complete instructions. Just \$19.95 + \$1.50 p&h from: Randy Schimka, 4081 Arizona Street #10, San Diego, CA 92104.

TIC-TAC-TOE for ET-3400A: A challenging game for the popular Heath Trainer. \$5. J&J Technologies Inc., 92 Henning Drive, Orchard Park, NY 14127.

Z3D will allow you to create a city, solar system, factory, etc., and plot courses using command files. Objects may contain other objects, and the inner objects will remain hidden from view until outer surface is penetrated. Create complex animation sequences for use in other programs. Z3D requires 128K, H/Z100, MS-DOS (Z-DOS) system. Included is complete documentation and tutorial. \$75.00 MC and Visa accepted. Colorworks, 5337 East Bellevue Ave., Tucson, AZ 85712, 602/325-0096.

Hardware

5 MEG HARD DISK SUBSYSTEM for H89/90, \$1,500 complete. Kits from \$930. CDI, 105 South Main Street, Greer, SC 29651, 803/877-7471.

Jerry Pindus will pay up to \$150 for H8s. Contact: 212/380-1004, 78-40

164th Street, Flushing, NY 11366. He also wants to contact the company or individual who bought the entire stock of H8s from Heath.

H89, 48K, H77 dual disks (SS/SD), cassette interface, software, FORTRAN course, assembly language course, all manuals and documentation, two years REMark, \$1,080 plus shipping. Dennis Newkirk, Route 4 Box 240, Alexander, AR 72002, 501/847-2363.

To get in touch with your fellow Heath/Zenith users, place your short notice in *Sextant's* classified section. The rate is only 75¢ per word with a minimum of 15 words. Send your typewritten ad and payment to: *Sextant*, Classified Ad Department, 716 E Street S.E., Washington, DC 20003. (Please include your name and telephone number for our records.) We need to receive ads for the May-June 1984 issue by March 9, and for the July-August issue by May 11. If you have any questions, contact Sharon Conway at 202/544-2868.

Luminaries

Ray Albrektson is currently an extension faculty member at the International School of Theology—Asia, in the Republic of the Philippines. He's looking into the possible Third World uses of computers in education. (With and without sound effects, presumably.)

Skip and Pam Chambers both attended Purdue University (M.S., Mechanical Engineering, and B.S., Psychology, respectively). He now works in the data processing industry in communications. She, contrary to the impression you might have, is helping their local Texas school system implement its computer-literacy effort. (Unfortunately, she has to deal with Another Brand at school. Might that explain something about her attitude toward computers?)

Charles Cohn is a physicist at the Argonne National Laboratory near Chicago. He works in computerized data acquisition and control systems for experimental nuclear reactors. (We still don't know how much of that work is done on a single-drive '89.)

Leonard E. Geisler got into electronics in the '30s, and into computers as a pub-

lications engineer in the '60s. Perhaps his interest in forms came later: he's Secretary Pro Tem of the A-SQR (Ann Arbor to outsiders) Heath Users' Group, in Michigan.

Dean Gibson has his bachelor's degree in Mathematics from the California Institute of Technology, and his master's in Computer Science from the University of Wisconsin. He's best known to most of us through his consulting company, UltiMeth, and his Heath/Zenith hardware support code. But besides ordinary folks, his customers have also included big guys like the Air Force and National Semiconductor. It pays to be organized.

Siebert Ickler is Systems Manager for the H.E.B. Grocery Company, headquartered in Corpus Christi, Texas. The job involves both micros (Heath/Zenith among them) and an IBM mainframe. So a little thing like an ESCAPE # won't slow him down, even if he has to slow it down.

Terry Jensen is the National Heath Users' Group's software developer. He's also system operator for the HUG Bul-

letin Board on CompuServe's MicroNet. So he gets to keep an eye on what folks are doing around the country.

Charles W. Rogers is a free-lance computer scientist. He divides his time among teaching, consulting, and farming in the southern Missouri Ozarks. He started out in the computer field writing assembly-language input/output drivers in the days of vacuum tubes. A programmer was a lot closer to a computer's innards in those days; so maybe that explains why he likes to see how the machine handles the numbers inside.

Graham Wideman provides hardware and software engineering support to microcomputer-based research projects, primarily at San Diego State University. (He's also been the editor of *Electronics Today—Canada*.) The research projects include areas as diverse as whale hearing, music-synthesizer algorithms, and the behavior of primates. (We don't think that includes the behavior of one species of primate when they get hold of software that doesn't work as they expected.)

Supplier Notes

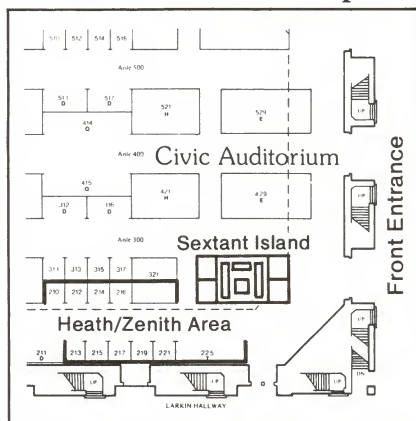
Heath/Zenith Area Biggest Ever at Ninth West Coast Computer Faire

Independent support for Heath/Zenith computers will be present in force at the Ninth West Coast Computer Faire, March 22-25 in San Francisco.

The Heath Company's booth will be surrounded by exhibits by supporting companies, including Kres Engineering, Magnolia Microsystems, Sextant Publishing Company, The Software Toolworks, and Trionyx Electronics.

To expand the size and effectiveness of the Heath/Zenith area, Sextant Publishing Company has rented the 20' X 40' island (booth #329E) across the aisle from Heath's booth. In turn, several independent suppliers have rented space within the booth from Sextant, including C.D.R. Systems Inc., Hudson and Associates, Micro Peripherals Inc. (MPI), Technical Micro Systems Inc., and Microservices.

Suppliers exhibiting in the Sextant island chose from several plans for renting exhibit space. As the diagram below shows, some rented a full 10' X 10' area at one corner of the island. Others



Floorplan of one corner of the Civic Auditorium, showing the Heath/Zenith area and the Sextant island.

rented table space by the square foot in the large (20' X 20') central area.

Some companies unable to attend the Faire will send promotional material to be displayed on a brochures table in the middle of the island. The display table will be maintained by the Sextant staff.

The West Coast Computer Faire is one of the oldest and largest micro-computer trade shows—and is considered by many to be the most important. Exhibits will cover two floors of the San Francisco Civic Auditorium and Brooks Hall. Attendance this year is expected to top 60,000.

The concept of bringing together Heath/Zenith suppliers in one exhibit area at the West Coast Computer Faire was first tried in 1982. That year, *Buss: The Independent Newsletter of Heath Co. Computers*, rented a 20' X 20' island and shared it with other Heath/Zenith vendors. The Heath Company provided essentially the same service in 1983, reserving blocks of space and making them available to the companies which support Heath/Zenith systems.

This year, the efforts of the Heath Company and Sextant will combine to create the largest, most impressive display of Heath/Zenith computer strength and support Faire-goers have seen to date.

Plotpro Creates Scientific Graphs, Templates

Plotpro is a set of three Microsoft BASIC programs which make scientific graphs on any 80- to 132-column printer. Plotpro creates linear, semi-logarithmic, and full logarithmic plots and will plot multiple functions on the same graph. Forced scaling and auto-scaling are supported as well as optional grid lines to aid in graph interpretation. Plotpro uses control characters to take advantage of more capable printers such as the Epson to improve the resolution of graphs.

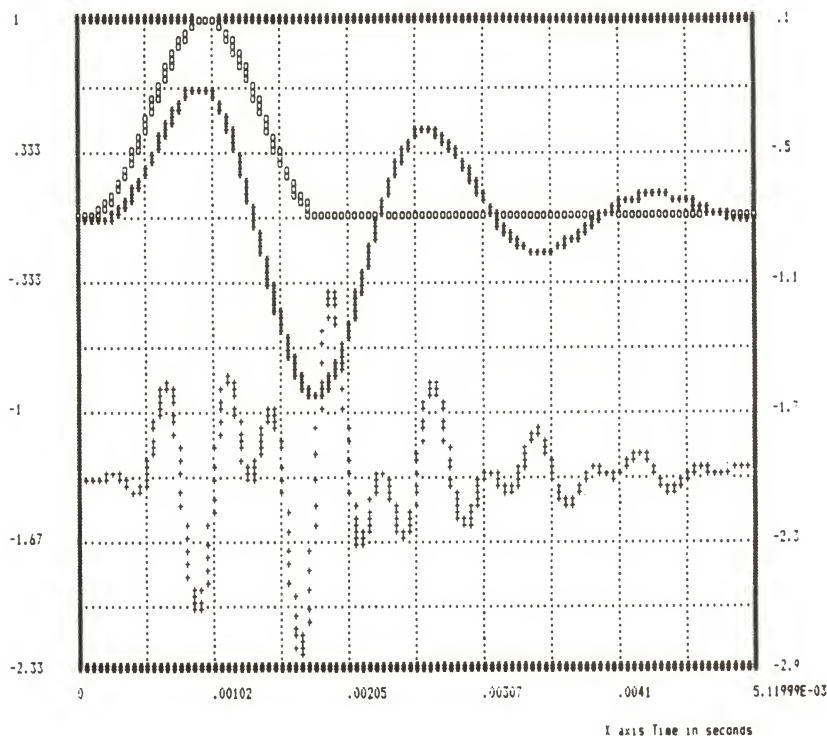
The Protemp model creates templates of the physical appearance of any graph. These templates specify the type of scaling (linear, log, forced, or autoscaled), axis labeling, ranges for each axis, user-specified control characters, and other information. Templates are saved to disk files to develop a library of frequently used templates for future use.

The Proquick module controls plotting and printing of infinite-length graphs limited only by paper length. Plotpro also generates vertical formats suitable for use in reports, viewgraphs, etc. Plotpro does not require special plotters, complicated data interfaces, assembly-language "hooks," or reserved graphics memory. Plotpro data files are easily generated by BASIC, FORTRAN, Pascal, or assembly-language programs. A 20-page manual and sample files are included.

Plotpro is available for Z89s and Z100s running CP/M on 5.25" double-

SIG1/SIG3 Y Axis:

Output response



o - LEFT AXIS - SIG1 - Input Haversine FROM FILE SIG1
 * - LEFT AXIS - SIG3 Data FROM FILE SIG3
 + - RIGHT AXIS - Output results (SIG4) FROM FILE SIG4

System haversine transient response. (Reduced to fit on page.)

density, single-sided disks. It is priced at \$49.95 for Plotpro and a 20-page manual, with a money-back guarantee.

For further information, contact Wilda Daggett, BV Engineering, P.O. Box 3351, Riverside, CA 92519, 714/781-0252.

Support and More

From the Heath/Zenith Compatibility Leaders

H8 PRODUCTS

The Most Extensive Line of Hardware Support for the H8®

- **DG-80/FP8**
Z80® based CPU including the powerful FP8 monitor — both only \$199.00. The acclaimed FP8 monitor package is included with the DG-80 CPU.
- **DG-64D/64K RAM Board**
Reliable, Low Power, High Capacity Bank-selectable RAM
Priced from \$233.00 (0K) to \$299.00 (64K)
- **DG Static 64**
Fully Static, High Capacity, Bank-selectable RAM. Also can be used as EPROM/PROM board (2716 type EPROMS). Priced from \$199.00 (0K) to \$499.00 (64K).
- **DG-32D/32K RAM Board**
Low cost, Dependable RAM for the H8 32K Version Only \$179.00.
- **DG-ADP4**
H17-4 MHz disk adaptor — \$19.95

THE SUPER 89

The DG SUPER 89 is a replacement central processor board for the Heath/Zenith 88-89 series of computers. The DG SUPER 89 offers advanced features not available on the standard Heath/Zenith 88-89 such as 4 MHz operation, real-time clock, optional AM9511A arithmetic processor, up to 256K of bank selectable RAM with parity check, and HDOS, CP/M and MP/M

compatibility. By incorporating current state-of-the-art technology available for the Z80, the DG SUPER 89 offers the user increased speed and system reliability for years to come. Full compatibility with all Heath/Zenith software and hardware products is designed into the DG SUPER 89. Electronic Disk Software included. Priced from \$829.00 (128K) to \$989.00 (256K).

HEARTBEAT

The DG Heartbeat is a compact computer system designed to be hardware and software compatible with the popular Heath/Zenith Z89/90 computer product line. The Heartbeat offers advanced features not found on the standard Heath/Zenith computer such as 4 MHz operation, real-time clock/calendar, two RS-232 serial ports, five peripheral expansion slots, 128 Kbytes (expandable to 256 Kbytes) parity checked RAM and provisions for an optional AM9511 Arithmetic Processor. Compatible with HDOS, CP/M and MP/M II (Multi-user) operating systems. Electronic Disk

Software included. The Heartbeat may be used with most popular video terminals on the market although the Heath/Zenith H/Z19, H/Z29 and ZT-10/11 video terminals are recommended for full Heath/Zenith software compatibility. The Heartbeat cabinet design provides for inclusion of hard and/or floppy disk drives as well as other desired peripheral interfaces and is color-coordinated for use with the Zenith Z29 and ZT-10/11 video terminals. Priced from \$1350.00 (Basic Unit).

CP/M®, MP/M and MP/M II® are registered trademarks of Digital Research of Pacific Grove, California.

H88/89®, Z89/90®, H17®, H77®, H/Z 47®, Z67® and H-88-1® are registered trademarks of the Heath Company and Zenith Data Systems.

Z80® and Z80A® are the registered trademarks of Zilog Corporation.

**DG ELECTRONIC
DEVELOPMENTS CO.**

Ordering Information: Products listed available from DG Electronic Developments Co., 700 South Armstrong, Denison, Tx. 75020. Check, Money Order, VISA or MasterCard accepted. Phone orders call (214) 465-7805. Freight prepaid. Allow 3 weeks for personal checks to clear. Texas residents add 5%. Foreign orders add 30%. Prices subject to change without notice.

Disk and File Management

It is easier to copy a file before it's accidentally erased than afterwards. (Disks, too.)

Dean Gibson

As you may have already found out, a computer tends to magnify the degree of organization that you have in your personal life.

That is, if you are organized in your personal affairs, then the way that you use your computer, and the way that you organize your files on your computer, will tend to be very organized. More importantly, if you are disorganized in your personal affairs, then the way that you use your computer, and the way that you organize your files on your computer, will tend to be very disorganized. And this will frequently lead to disasters: programs and data accidentally destroyed, missing or misplaced programs and data, etc.

Regardless of which type of person you are (organized or disorganized), it pays to spend some time organizing how you operate your computer system.

So let's consider two aspects of organization in the operation of your computer system: first, which files go on which disks; and second, file backup.

In discussing these points, I will assume that your computer system has two disk drives. It is hard to get anything done on a computer with only one disk drive; and most of my comments are applicable only to systems with two or more disk drives. Further, I will also assume that most of you have 5¼" disk drives. (The larger storage capacity of 8" and hard disks may reduce the day-to-day pressure for some of the discipline imposed on the users of 5" drives. However, damage to one 8" disk will usually incur a much greater loss than a damaged 5" disk. So the points discussed here are still important for users of the larger disks.)

Also, I will tend to minimize mention of features specific to the various operating systems most of us use. I minimize the operating-system features mainly because the principles that I will be discussing are generally applicable to all computer operating systems. (I use CP/M in my microcomputer consulting work; the rest of the time, I use the Heath Disk Operating System—HDOS.)

Which files on which disks

Most of us have already decided

which files go on which disks. The organization I am going to describe is the one that I use, adapted slightly. Because of the size of your disks and the number of program and data files that you may have, you may need to adapt my organization slightly or extensively.

Ask yourself how much time you are willing to spend reconstructing or re-keying lost data.

However, the organization that I use not only assists me in locating a file that I want, but also assists me in backup and recovery, as I will describe later.

First of all, I divide disks into two categories: bootable system disks; and non-bootable "working" disks.

I would suggest keeping two or three bootable system disks. The first bootable disk would contain the operating system (CP/M, HDOS, or the Zenith Disk Operating System—Z-DOS) fully configured for all hardware devices that you have. It would also contain all operating-system utilities. (For CP/M, that would include, for instance, PIP, STAT, MOVCPM, SYSGEN, and CONFIGUR—called SETUP on Magnolia Microsystems CP/M; for HDOS: PIP, FLAGS, SET, INIT, SYSGEN, TEST17; and similarly for Z-DOS.)

This disk would always be used to create a new bootable system disk. If there is enough room, this disk could be combined with the second bootable disk.

The second bootable disk would be the system disk that you would normally boot. It would contain the operating system (CP/M, HDOS, or Z-DOS) fully configured for *all* hardware devices that you have. It would contain *frequently* used utilities (such as PIP or STAT) and those other programs you frequently use (e.g., a compiler/assembler, BASIC, or an editor or word processing program).

The third bootable disk would be booted when you needed the maximum

amount of random-access memory (RAM) for a program. This disk might contain the operating system configured to use a minimum amount of RAM; the operating system would be configured for only those hardware devices that you *commonly* use. Like the second disk, it would have only frequently used utilities. And it would contain those programs that manipulate files which need a large amount of memory. (These, too might be the same as the second disk. A compiler, BASIC, and a word processing program may all need to call upon a large amount of memory. You would use the second disk when they handle smaller documents or programs; the third when they work on large ones.)

All of your other disks would be non-bootable, and would be organized by function. For example, disks containing letters that you have typed, BASIC program disks, assembler program disks, game disks, etc.

With this system, then, we would have two types of disks. The contents of the bootable disks would not change much, simplifying backup of them. The original distribution disks serve as the backup to the first bootable disk. It, in turn, serves as backup for the other two. (Although a duplicate of each might still come in handy.)

The data and program disks would be subject to extensive changes and hence need to be backed up accordingly.

This brings me to my next subject: backup.

Backing up files

The purpose of backup is to protect wanted programs and data from being lost or destroyed. As you know, there are two types of errors: human errors and machine errors. Backup is intended to protect against both.

An effective backup system requires a plan. When an error occurs, it may be detected immediately, or it may be detected later, perhaps months later, when the data or program is next used.

If all errors were detected immediately, backup plans would be relatively simple. However, what good does it do to back up your disks weekly, saving the last two months worth of backups, only

to find out that you somehow lost some important data three months ago?

The first rule of a backup plan is to use whatever features the operating system provides, in combination with any features provided by your word processor or other software.

The next point to remember is that you do not have to back up everything. Consider a selective backup plan: only back up the files that have changed.

There are several simple ways to implement a selective backup plan. For example, what do you do when you alter a file and save the altered file to disk under the old name? Many editors and word processing programs have the ability to give the previous version of a file an extension of ".BAK". If you have this, not using it is false economy.

You can back up files having the .BAK extension using your operating system's ability to copy wildcards (*). Copy all files with extension .BAK to a backup disk. Then delete all .BAK files off the first disk. While this scheme does not provide a "current" backup copy, it is very fast.

Under HDOS, another alternative is to set the "System" flag on all files. When a file is replaced, the "System" flag disappears, showing which files have changed. You can back up files by periodically copying all the non-"system" files.

A third alternative, for those operating systems which maintain a date (CP/M Plus, HDOS, and Z-DOS), is to use the creation date of the file as a means for determining which files have changed. There are many backup programs commercially available which use the date or one of the "user flag" fields in the directory to keep track of changes. They automatically save changed files onto another disk.

Those with lots of room may consider another alternative: simply adopt a file-name convention that provides for perpetual backups. Each new version might receive a new name: NAMEA, followed by NAMEB, NAMEC, and so on. Such a backup, however, leaves all the files on the same disk.

For a selective backup plan to be effective in locating data that you have selectively backed up, it is probably best to copy changed files to an older backup copy of that entire disk, writing over the previous version of those files.

Backing up whole diskettes

Although a selective backup plan is important, you should also consider the need for backing up whole diskettes. In this regard, ask yourself how much time you are willing to spend reconstructing or re-keying lost data. Compare that amount of time with how long it takes you to back up the data. The rule of thumb that I use is to figure the time that it would take to reconstruct or re-key my data. If it exceeds 20 times the time it takes to back up all my data (that is, my non-bootable disks), I do a complete backup of the entire diskette. I do selective backup more frequently.

How long should you save your backup diskettes? The best plan is to save them forever, or for at least a couple of years. However, that usually is not feasible.

So you may wish to consider the following schedule. Assume that you create a backup diskette for a given disk each week. Save each weekly backup diskette for a month. Once a month, relabel the oldest weekly diskette as a monthly backup diskette; save monthly backup diskettes for three months. Once a quarter, relabel the oldest monthly diskette as a quarterly backup diskette; save quarterly backup diskettes for a year. Once a year, relabel the oldest quarterly diskette as a yearly backup diskette; save yearly backup diskettes for three years, or forever.

Your backup diskettes would then have the following history:

One-week-old backup
Two-week-old backup
Three-week-old backup
One-month-old backup
Two-month-old backup
Three-month-old (one-quarter-old) backup
Two-quarter-old backup
Three-quarter-old backup

Four-quarter-old (one-year-old) backup
Two-year-old backup

With this plan, a disk that is backed up on a weekly basis only requires nine diskettes to cover a year's worth of history. Some disks, however, may only need to be backed up on a monthly basis. In such a case, only six diskettes are required for a year's history. Once they stop changing, you can stop backing up (e.g., when a letter disk fills up).

Note that this plan serves as an adequate backup for all files on a disk, whether they are changed frequently (in which case, errors would normally be detected quickly), or whether they are changed rarely (in which case an older backup will usually suffice). You can alter this scheme to fit the changeability of your files.

In summary

In summary, remember that good computer operating practices come from organization. Organizing your files on your disks not only can assist you in locating files on disks, but also can assist you in making adequate backup plans.

File organization:

- 1) Have two or three bootable disks with system utilities and commonly run programs.
- 2) Group all other programs and data on other diskettes.

A good backup plan:

- 1) Use operating system or word processor backup features.
- 2) Consider a selective backup plan.
- 3) Decide how often you should back up.
- 4) Decide how long you should save your backup diskettes.

One more item: there is a saying among computer professionals that when you first detect that you have lost or destroyed some data, many times the data has not yet been irretrievably lost. The next thing you do (perhaps as simple as asking for a catalog) may turn out to be a bigger error than the first. So, before it happens, calm down; write-protect all valuable disks. And proceed slowly.

FRIENDLIWARE

P.O. BOX 21206

LANSING, MI 48909



FRIEND
LIWARE

517/882-1675

CPIM is a trademark of Digital Research

CELLS.COM \$15

CUBES.COM \$15

DOTS.COM \$15

DISARM.COM \$35

FIREFLY.COM \$20

MATCH.COM \$30

PID.COM \$26

SLABS.COM \$15

On 5" HS SSSD media for HEATH/ZENITH 89 or equivalent, running CP/M

FIREFLY — Many years ago my father told me that, when he was a boy, he would go camping. He said he brought a jar with him, and caught enough fireflies to be able to read in the tent at night. I never fully believed that tale, but that is how to solve this game/puzzle. You have a jar with a removable lid, and twenty fireflies wander about. The first challenge is collecting all the flies. The second one is naming a familiar saying. When four or more fireflies in the jar flash at once, you see clues, written in the dark.

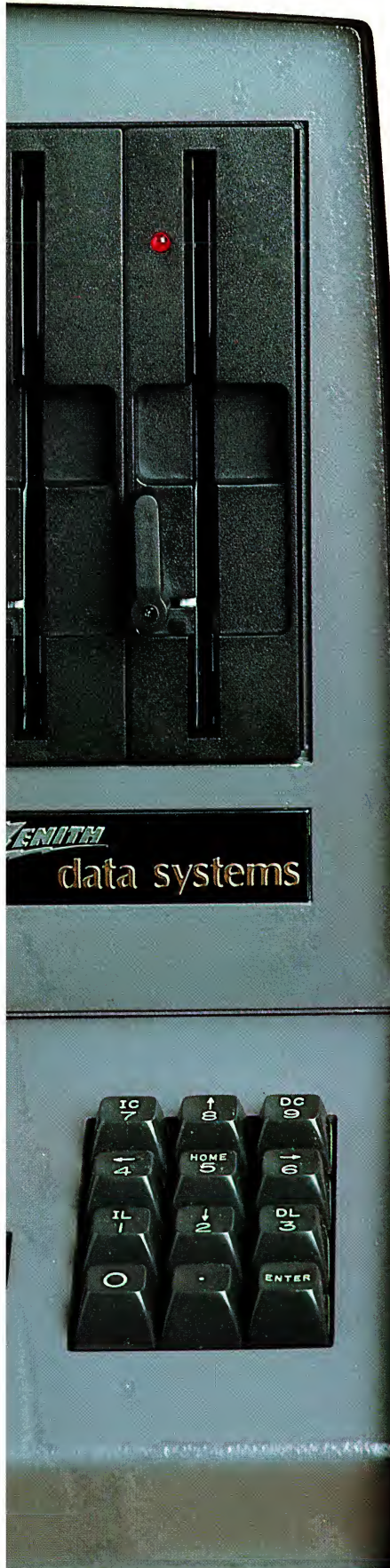
PID — A graphic, dynamic, programmable, programmed instruction with numerous experiments in closed-loop control. No previous higher mathematics required.

!!!!!! More DISARM hints !!!!!!

Top: Confuse the FUZE for a FUSE, and you shall render your dues.
Base: Disable booby trap first. TILT (TIP) OBJECT from front only.
Left: De-energize the electromagnet before removing anything here.
Right: "... all four bits" You may have seen these elsewhere.
Front: Find the LATCH. It disables a booby trap (clicking SOUND).
Back: Leave hexed covers OA,OD for last. Alternate perseveringly.

NEW FROM FLOPPY DISK SERVICES, INC.

the H-89 TWOET SYSTEMS



We've got a great idea for your H-88, 89 or 90. It's a dual *internal* half height drive system. Two of our half height 5 1/4" drives can replace your built-in disk drive, doubling your information storage capacity.

Floppy Disk Services provides you with everything you need. That's two double-sided, double or single density, half height drives in either 48 or 96 tpi format, all hardware, cables and power connector adaptors. And most important, you get easy, step-by-step instructions, in the Heath/Zenith tradition of good, clear documentation.

We've thoroughly tested the TWOET/Heath set-up. Remember that a double sided 48 tpi will work perfectly as a single sided drive right out of the box! Hard or soft sector—so you can even use this system with your H-17 controller. And of course we have the software drivers (additional cost) to run 48 or 96 tpi double sided, single density drives on the H-17.

Model TWOET 455

2 Shugart SA-455 half height
48 tpi double sided
All hardware
Metal, shielded mounting plates
Data cable with chassis connector
Power 'Y' connector
Complete documentation
Price .. \$605.00 complete

Model TWOET 465

2 Shugart SA-465 half height
96 tpi double sided
All hardware
Metal, shielded mounting plates
Data cable with chassis connector
Power 'Y' connector
Complete documentation
Price .. \$755.00 complete

Wondering what to do with your internal drive if you buy this system? Here's the solution. If you purchase a dual half height system for your Heath computer from Floppy Disk Services, just include an extra \$50.00 plus shipping and receive a single 5 1/4 case with power supply *and* data cable ready to receive your SIEMENS internal drive! The case with data cable is normally a \$70.00 item. And the cable that comes with your TWOET system includes the external chassis disk I/O connector.

Due to production deadlines, prices in this ad are 2 months old, so we encourage you to call us for current prices and new product info. Prices and specs subject to change without notice.

Dealer inquiries invited.

PAYMENT POLICY — We accept MasterCard, VISA, personal checks and Money Orders. We reserve the right to wait 10 working days for personal checks to clear your bank before we ship. All shipping standard UPS rates plus shipping & handling. NJ residents must add 6% tax.

Toll Free Order Line:
(800) 223-0306

Tech Help or Info:
(609) 799-4440

H-88/89/90 are registered trademarks of Heath Corp.

**FLOPPY
DISK
SERVICES™
INC.**

741 Alexander Rd. Princeton, NJ 08540
Circle #117 on Reader Service Card

Zenith Owners!

**HUSKER SYSTEMS OF NEBRASKA, INC. PRESENTS
WINTER SOFTWARE SPECIALS THAT YOU CAN'T BEAT FOR PERSONAL COMPUTING ENJOYMENT!!**

Video*Professor Computer-Based Training Systems help you learn quicker and with greater enjoyment than with conventional self-study courses. They are designed to let the computer interactively teach you rather than requiring hours of boring textbook study.

Currently there are 3 courses available: MBasic Programming I, Assembler Programming I, and How To Program, A Structured Programming Methodology. All three are available under HDOS and CP/M-80 for the H/Z89-90 (on hard sector diskettes) and under ZDOS and CP/M-85 for the Z100 (on soft sector diskettes). The regular retail price of each Video*Professor product is \$29.95, but...

By referencing this special offer you can get one Video*Professor for \$22.00, two for \$42.00, and ALL THREE FOR \$62.00!! This offer is good through March 31, 1984, and you should keep your eyes open for other additions to the Video*Professor product line.

ZMAG is the **Software Subscription Service** which provides you with a continuing stream of valuable software over a year's membership. Like a magazine, ZMAG provides you with interesting articles and personal computing tips, but with each issue you also get a diskette with **up to 15 PROGRAMS ON IT!** These programs include everything from games to business and personal aids to system utilities. ZMAG is available under CP/M-80 (on hard sector diskettes) and under ZDOS and CP/M-85 (on soft sector diskettes).

There are 8 issues (8 diskettes) to a ZMAG subscription year. The regular annual subscription rate is \$240.00, which is \$5.00 per issue under the "news stand" price. For this special period ending March 31, 1984, you can obtain a ZMAG subscription for **ONLY \$177.00! THAT'S A 25% DISCOUNT.**

BETTER STILL, ORDER BOTH A ZMAG SUBSCRIPTION AND THE 3-PRODUCT VIDEO*PROFESSOR SERIES AND GET THE WHOLE PACKAGE FOR JUST \$227.00! (It's a \$329.70 value!)

Just use our handy order blank provided below or call us at **(402) 558-5702**. By the way, we have **over 40 other fine software products for Zenith computers**, all reasonably priced, and we can fulfill your media and hardware needs economically as well. Be sure to ask for our free price list, and please specify the operating system you desire for each product. Thank you.

Husker Systems of Nebraska, Inc. -- Fine Heath/Zenith Microprocessor Products

Method of Payment: ☐ CHECK ☐ MC/VISA # _____ EXPIRES _____

QUANTITY	PRODUCT DESCRIPTION (INCL OPERATING SYSTEM)	UNIT PRICE	TOTAL PRICE*
		TOTAL	

NAME _____ TEL _____
STREET _____ CITY _____ ST _____ ZIP _____
#1212

Send Order To:
Husker Systems of Nebraska, Inc.
5208 Hamilton, Omaha, NE, 68132
Check Here For Free Catalog ☐

Circle #189 on Reader Service Card

Scuttlebutt

Pat McNamara, former Zenith Data Systems director of marketing communications, has left ZDS to go to work for **NBI** in Boulder, Colorado. He joins another former ZDS marketing executive, **Robert Reid**. NBI makes dedicated word processors and sells word processing programs for personal computers.

Government employees, including **reservists**, can get a **Z100** for a bargain price. The Air Force and Navy pay **\$1,799** for their Z100s, now that the Z100 is the standard desktop computer for the two services. Zenith is selling the '100s through the Government Employees Association for the same price. Ordering information will be sent only to GEA members. If you're not a member, send them a request for membership and ordering information. You should include your name, address, agency, and date of birth, as well as a lifetime fee of \$10. (GEA, P.O. Box 2405, Arlington, VA 22202, 703/920-5800.)

One source outside GEA told *Sextant* that Zenith has sold "zillions" of Z100s through GEA.

Michael Lougee of the University of Michigan's Institute for Social Research dropped by *Sextant* recently. He reports that there are now at least **350 to 400 Z100s in Ann Arbor**.

Lougee also mentioned that a statistical package called "ABC" may be coming out of the University of Michigan this spring. The program, which is intended for people **without** statistical or computing expertise, is running under MS-DOS for the IBM PC and will soon be adapted to run on the Z100.

By the time you read this, you may be able to run PC software like "ABC" on Zenith's newest computer, an IBM PC "clone" expected early this spring.

Zenith is also working on a version of the Z100 with a detachable keyboard and a handle. Apparently it's a bit heavy—so much so that it's been dubbed the "transpushable."

Work is underway to organize a **Western Regional HUG Conference** in Southern California in late 1984. Watch this department and *Buss: The Independent Newsletter of Heath Co. Computers* for further information.

The Software Toolworks recently received some kudos in one of the nation's most influential newspapers, *The Washington Post*. T. R. Reid, one of the personal computer columnists for the weekly *Washington Business* section, chose to inaugurate his column with a guide to spreadsheet "best buys." He singled out The Software Toolworks' Zencalc, at \$49.95, as "one of the best software bargains I've ever seen."

We think the availability of **low-cost, high-quality software from the Heath/Zenith community** should be one of Zenith's strongest selling points. For example, we use Steve Robbins' **WatchWord** word processor on the Z-DOS side of our Z100. It has all the features of the \$300-\$500 programs which are so highly touted for the IBM PC—and WatchWord sells for just \$100. (S & K Technology, 4610 Spotted Oak Woods, San Antonio, TX 78249; 512/492-3384.) Another example: we recently received a press release about a \$120 program for the PC which transfers files from PC-DOS format to CP/M-86 and vice versa. We transfer files between Z-DOS and CP/M-85 on our Z100 using RDCPM, which is **provided free with Z-DOS**, and another program, J. J. Thompson's ZCOPY, which costs only \$21.00 with shipping. (281

Warren Avenue, Kenmore, NY 14217, 716/873-0380 after 5 p.m.) It would be nice if Zenith did more to make potential customers aware of these **H/Z100 software bargains**.

Imitation is the sincerest form of flattery, and one product will let a Kaypro II imitate the H/Z19 graphics set. The Graphics Adapter board enables the Kaypro II to emulate most of the features of the H/Z19 terminal. It's advertised on p. 98 of the November/December 1983 issue of *Pro/Files*, "the magazine for Kaypro users." (\$175, Gilderfluke & Company, 120 Midway Drive #013, Anaheim, CA 92085; 714/776-2207.)

Also, software is available which will transfer CP/M files from Kaypro disk format to Zenith disk format, and vice versa. (Disk-Tran: \$20 for Zenith to Kaypro,

\$20 for Kaypro to Zenith; Computer Consultants to Business, 1033 Bishop Walsh Road, Cumberland, MD 21502, 301/759-1260.)

Sextant author **Hugh Kenner** has finished work on a **Z100 book** for Robert J. Brady Co., a division of Prentice-Hall. It's expected early this summer.

Sextant will have a booth in the Heath area at the **Ninth West Coast Computer Faire**, which will be held in **San Francisco, March 22-25**. (See Supplier Notes for more details.) Drop by and say hello—the *Sextant* staff will be there in force.

After the West Coast Computer Faire, we'll be going to New Jersey for the oldest microcomputer conference of them all—the **Trenton Computer Festival**, April 14 and 15.

8087 SUPPORT FOR THE Z100

Hudson & Associates is proud to announce a new product, the 8087 SYSTEM SUPPORT BOARD for the Heath/Zenith Z100 computer. The board features the 8087 Coprocessor along with 256K bytes of ram all on a high quality S100 board. The 8087 board also operates without any software modifications to the operating system.

- ** Easy Installation.
- ** Full documentation. Including installation guide, theory of operation, and schematics.

OPTION 1	without memory (8087 circuitry fully assembled and tested - socketed for 256K upgrade at a later date - note, memory circuitry not tested)
SUPPORT BOARD 8087 only	Price <u>\$595.00</u>
OPTION 2	with 256K of memory without 8087 circuitry (256K of memory fully assembled and tested - socketed for 8087 upgrade - note, 8087 circuitry not tested)
SUPPORT BOARD Memory only	Price <u>\$595.00</u>
OPTION 3	with 256K of memory (8087 circuitry and memory fully assembled and tested)
SUPPORT BOARD 8087 AND 256K OF MEMORY	Price <u>\$995.00</u>

Prepay or C.O.D. orders accepted
To order Contact

Hudson & Associates
P.O. Box 2957
Santa Clara, CA 95055-2957
Phone (408) 554-1316

Prices and specification subject to change without notice.

THE SECRETS OF PERFECT MEMORY: ONE AND ONE HALF EARTH DOLLARS

AT LAST: THE WHOLE
TRUTH ABOUT FLOPPIES.

Amazing book reveals
all!

How to keep from
brainwashing your disk
so it never loses its
memory.

How fingerprints can
actually damage disks.
Unretouched Kirlian
photographs of UFO's
(Unidentified Floppy
Objects)! The incredible
importance of making
copies: the Department
of Redundancy Depart-
ment—and what goes on
when it goes on! Power-
ful secret methods that
scientists claim can ac-
tually prevent computer
amnesia! All this, and
much more . . .

In short, it's an 80-
page plain-English,
graphically stunning,
pocket-sized definitive
guide to the care and
feeding of flexible disks.

For The Book, ask your
nearest computer store
that sells Elephant™
disks, and bring along
one and one half earth
dollars.

For the name of the
store, ask us.

*Elephant Memory Systems®
Marketed exclusively by
Dennison Computer Supplies,
Inc., 55 Providence Highway,
Norwood, MA 02062. Call
toll free 1-800-343-8413.
In Massachusetts, call
collect (617) 769-8150.
Telex 951-624.*

